AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

VOLUME 20. NEW YORK, THURSDAY, OCTOBER 21, 1897. NUMBER 42.

Staking and Riveting Tools.

BY A. H. CLEAVES.

Figs. 1, 2, 3, 4 and 5 will show how dial feet are fastened into the dial copper or plate which holds the porcelain upon which the figures and other things are painted for watch faces and similar work; although photography has superseded, generally, the hand painting and rubber stamping or transfer process.

But the process of finishing the dial face has no particular bearing on the one of securing these wire feet to the dial copper. I have put dimensions on the pieces in these sketches, as they form an important factor in this particular job.

These feet or pins are, in the operation described, fastened into the plate as a method of holding them in position while being brazed in the furnace. A little brass ring cut from a spiral coil or close-wound spring is used, with flux for securing the pins permanently. The feet enter holes in the watch plate to locate and hold the dial in place, small screws in the plate touching each dial foot.

Fig. 3 shows one of the pins (enlarged), having a little concaved bevel-shaped end, as shown, which is staked into the copper plate *a*, Fig. 2, as seen.

Fig. 1 shows the one of several methods that I finally adopted in my experience as the best for the purpose of making a raised indentation in the copper. This is substantial, easily made accurate, removed, repaired, etc., and will not settle under the repeated pounding of the press making the sink. In Fig. 1, *A* is a hardened die blank for holding the impression dies or punches, as they may be.

This is made so that the blank can be put on a master plate and accompanying lathe chuck and, after being hardened, ground in the holes to correct any spring in hardening. The chamber *c* at the bottom of the hole *b* allows a diamond lap, running very fast, to pass the surface of *b* and grind it true without coming to a corner.

Then *d*, *e* and *f* are made separately, as shown, and, being true and hardened, drive closely into *b*. The hole *g* is for driving the pieces out.

Fig. 4 shows another method of making these dies, which I found very defective, as the parts were so small and the pressure so great that *a* settled in *b*, the latter having such a small shoulder; which made a very serious fault in the work at *c*.

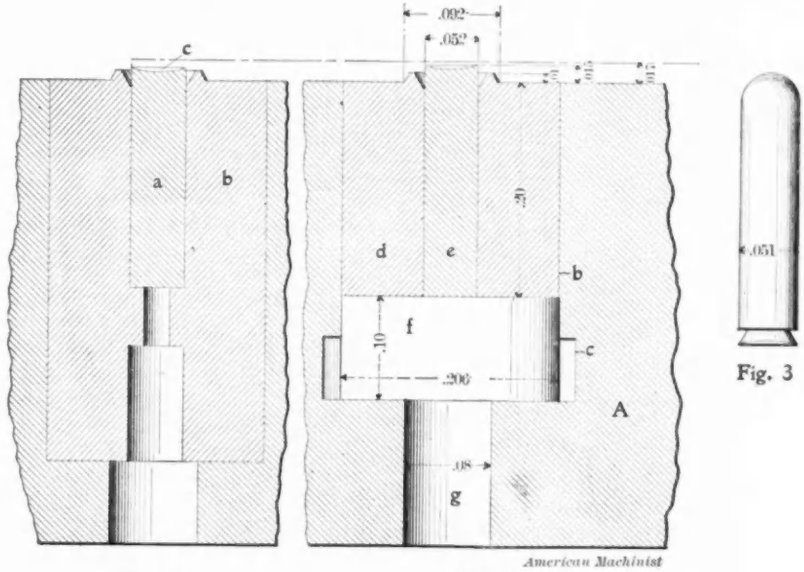

Fig. 4 Fig. 1 Fig. 3

STAKING TOOLS.

Fig. 2 shows another style of hand stake used in securing the dial feet in the copper. In the table or bed of the staking tool is a pin *b* for the center of the dial copper to revolve around. The sink in the copper for the pin *c* is brought under the closing stake, the pin *c* having its upper end in same.

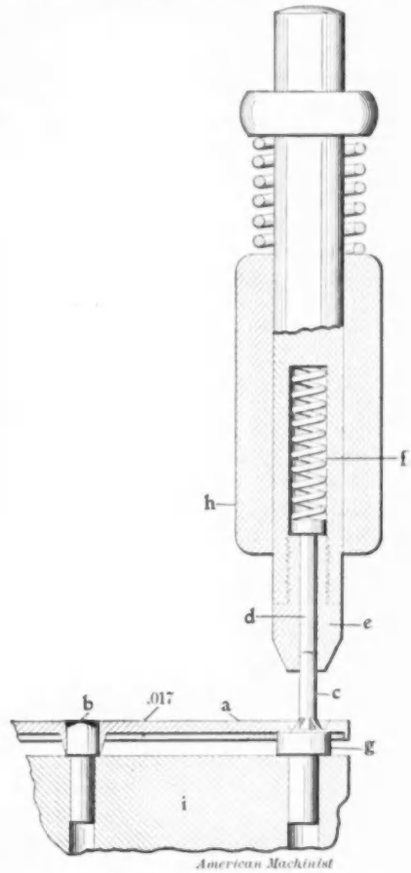

Fig. 2

PLACING PINS.

When thus in position the piece *d* pushes up the spring *f*, and the hardened piece *e* closes in the copper metal around the beveled end of *c*, and this holds the feet until they are brazed. *g* is a hardened block to stake on.

The sections *h* and *i* are upper and

lower parts of such staking tools as I have illustrated in a former article.

In order to avoid any confusion in the reader's mind, I will repeat that Fig. 3 is a piece of copper wire with the lower end turned as shown. These are made separately, in large quantities, in a small lathe and cut off. Then they are staked into the copper dial plate, as shown in Fig. 2, *a* being the copper plate with rim turned down, and center drawn down to keep the enamel paste in place when being baked.

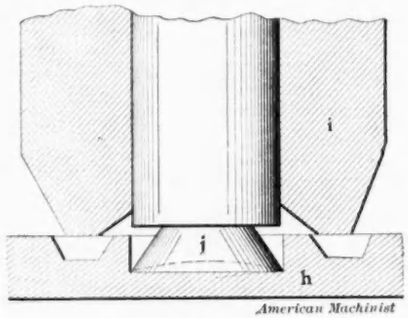

Fig. 5

The dies, Fig. 1 (a good style), or Fig. 4 (a poor one), are used for making the impression into which *c* is held, as shown in Fig. 2. The copper stock is soft and .017 thick, and is pressed between the surface of *A* and a hardened plain die-block, which forces up the copper into the shape of *h*, Fig. 5; then the stake *i* closes in the ring on the end *j*, and this holds it until brazed.

Chicago, Ill.

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A Large Post Planing Machine.

Our readers will remember an article describing a large boring, drilling and milling machine, made by Bement, Miles & Co., of Philadelphia, Pa., for the Bethlehem Iron Works, which appeared in our issue of May 6th last. The machine was intended more especially for machining armor plate, and we illustrate herewith a companion machine intended for work of the same character.

This machine is an outgrowth of an inquiry for a large planer of the ordinary type. Armor plates are of course large and heavy, although the work to be done upon them is confined to their edges, and it is obvious that a planer large enough to take in the pieces would be disproportionately expensive when the work to be done is considered. A machine of the type shown was therefore suggested by the builders, the suggestion being based upon their own experience with a machine of similar type which has been in use in their own works for several years. In addition to a smaller cost for a given capacity, it has the further advantage of being much more flexible in its adaptation to the work, and of being capable of doing some jobs which could scarcely be done upon a planer at all.

The half-tone illustration gives a good general idea of the appearance of the ma-

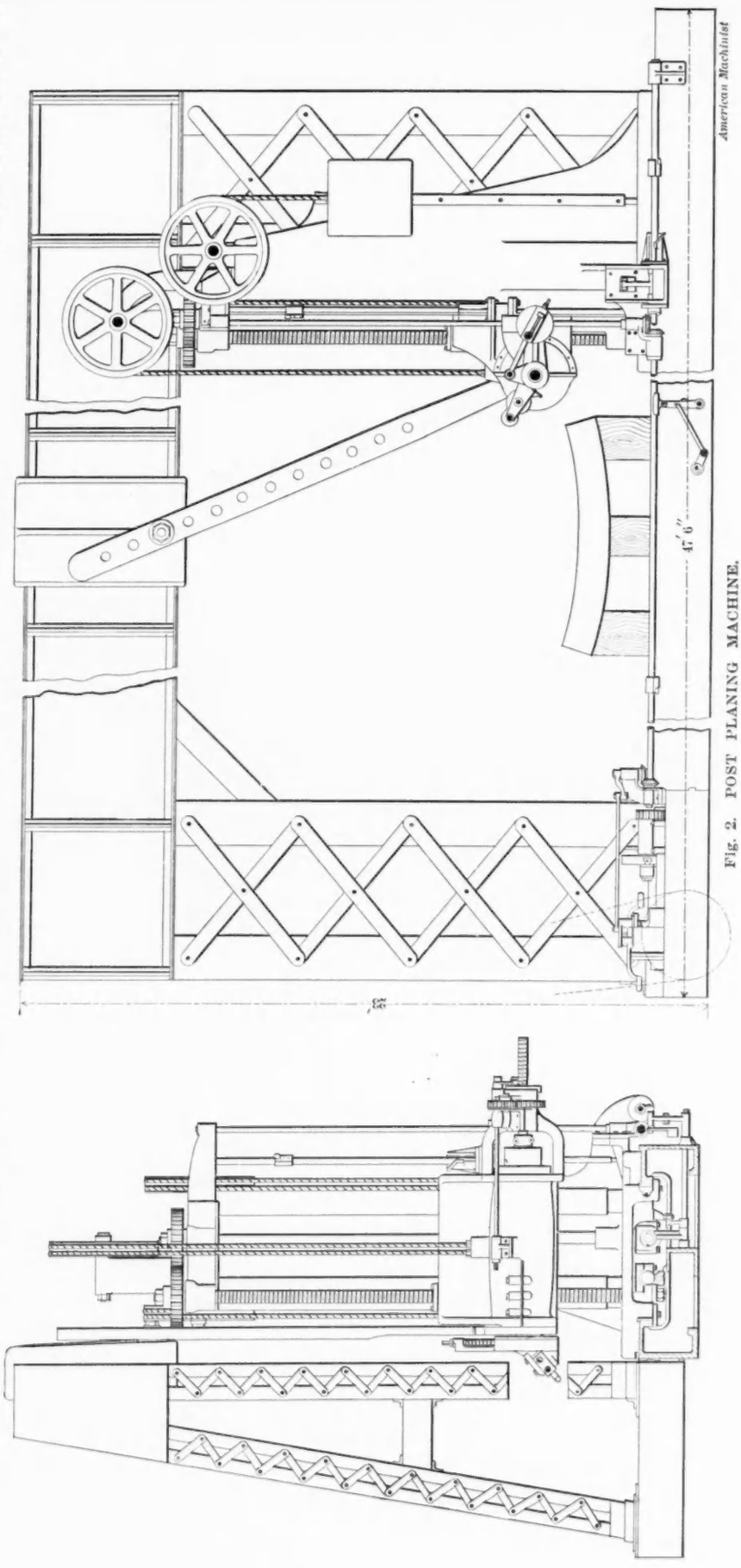
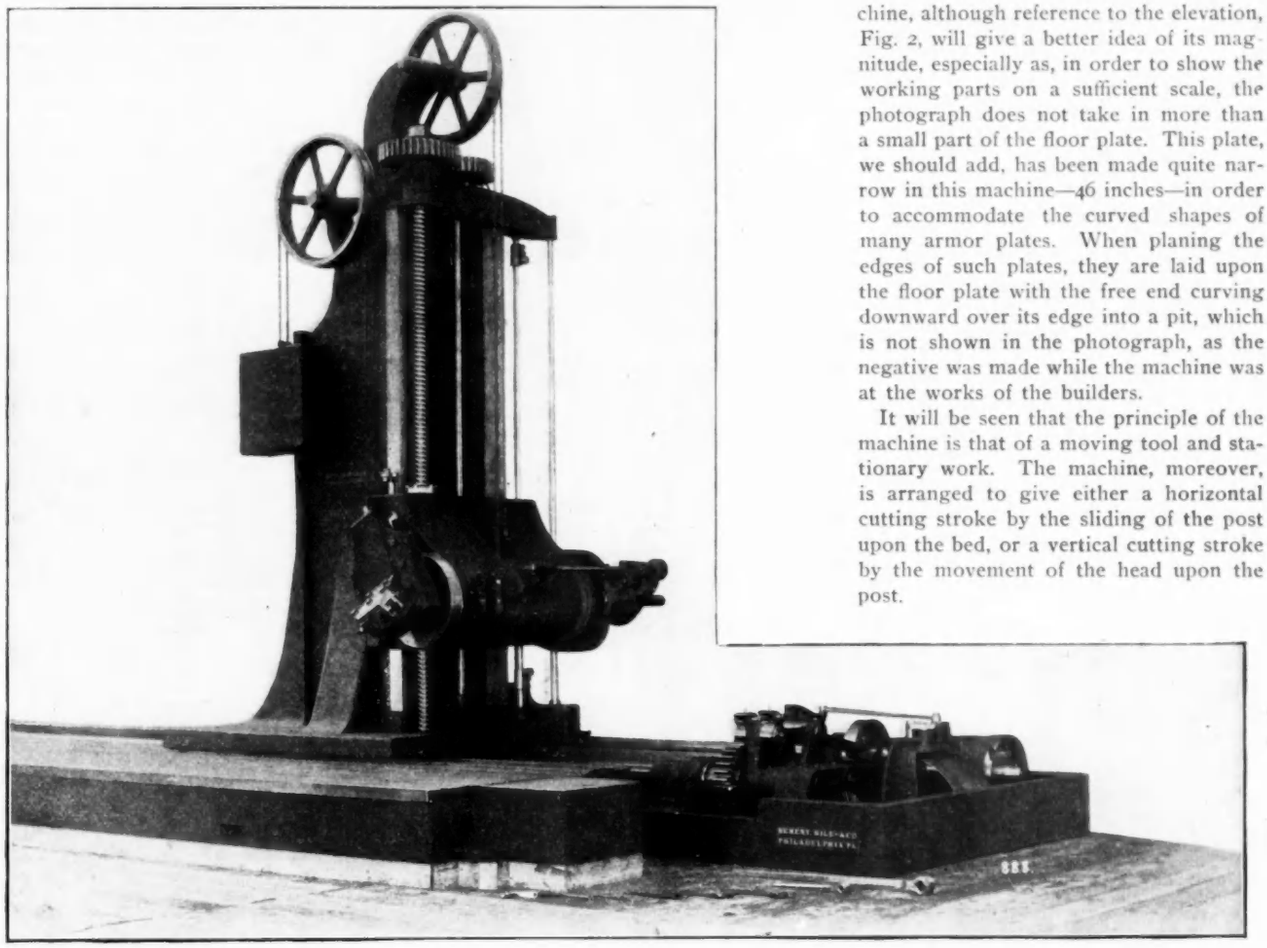


Fig. 2. POST PLANING MACHINE.



POST PLANING MACHINE.

chine, although reference to the elevation, Fig. 2, will give a better idea of its magnitude, especially as, in order to show the working parts on a sufficient scale, the photograph does not take in more than a small part of the floor plate. This plate, we should add, has been made quite narrow in this machine—46 inches—in order to accommodate the curved shapes of many armor plates. When planing the edges of such plates, they are laid upon the floor plate with the free end curving downward over its edge into a pit, which is not shown in the photograph, as the negative was made while the machine was at the works of the builders.

It will be seen that the principle of the machine is that of a moving tool and stationary work. The machine, moreover, is arranged to give either a horizontal cutting stroke by the sliding of the post upon the bed, or a vertical cutting stroke by the movement of the head upon the post.

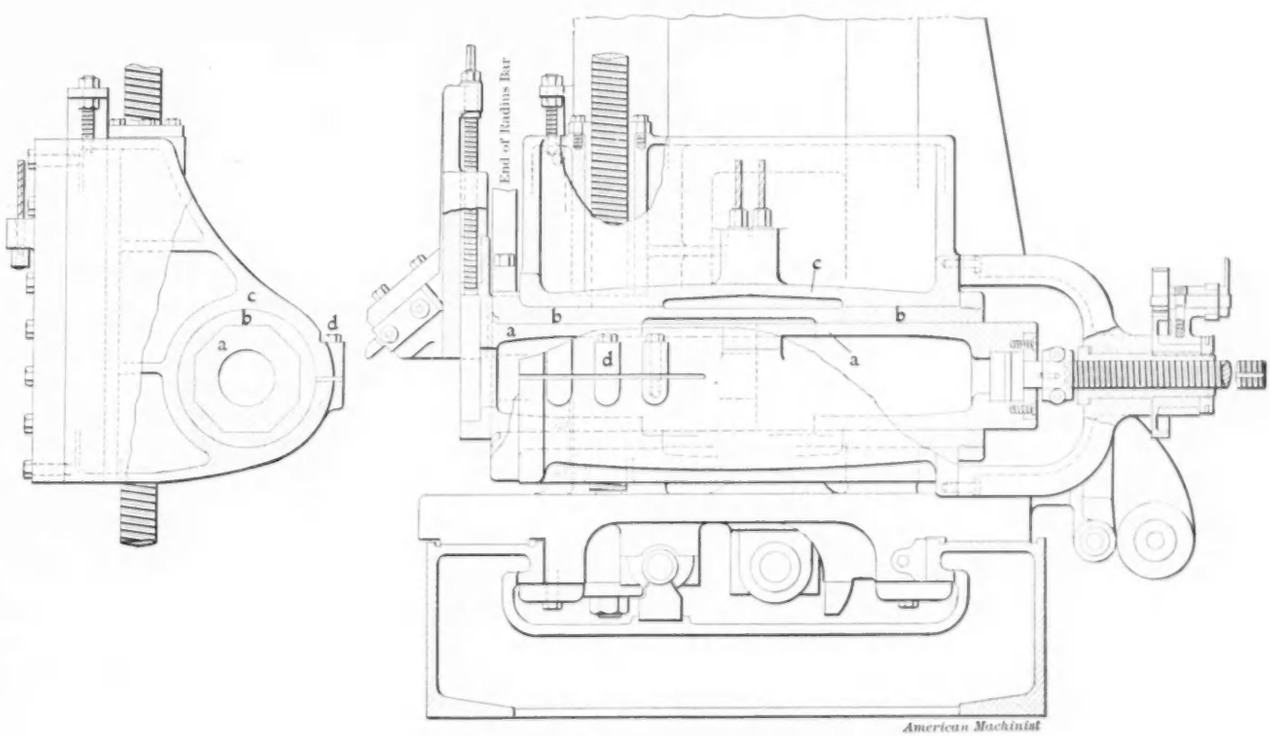


Fig. 3. TOOL HEAD OF POST PLANING MACHINE.

In order to accommodate the two directions of the tool movement, and also to accommodate an additional movement to be described presently, the tool box is mounted, as shown in lengthwise and crosswise section in Fig. 3, upon an octagonal bar *a*, by which it is slid inward and outward in order to accomplish the feed in that direction, and this bar is placed within a cylindrical sleeve *b*, which can turn within the head *c* and be clamped in any position by means of the clamping bolts *d* seen upon its side. By means of the adjustment provided by this sleeve the tools are made to face in their proper direction for either the horizontal or the vertical cutting stroke. The tool box is, moreover, made to carry tools facing in both directions, so that cutting is done both going and coming. Of course, under the various conditions of work, a gravity return of the tool clappers could not be depended upon, and consequently a spring return has been inserted in the tool box. The additional movement referred to above will be seen in Fig. 2, which shows a riveted iron structure placed over the machine with a sliding adjustable head thereon and a radius bar connecting it with the tool head. Provision is made for releasing the tool head from the vertical driving screw and for placing it under the control of the radius bar, whereby the planing of rabbited joints upon the bottoms of ships' turrets may be accomplished. This radius bar is attached to the head of the sleeve previously described, as shown in Fig. 2, and when used in this way the clamping bolts for this sleeve are slackened, thereby enabling the tool head to turn about its own axis and maintain a proper clearance angle to the tool.

Both horizontal and vertical movements have cutting speeds of 4, 8, 12 and 16 feet per minute, and feeding speeds in addition, so that the machine may be used either way according to convenience.

The traverse of the post on the bed is 30 feet, and of the saddle on the post 8 feet, while the horizontal movement of the octagonal cutter bar is 28 inches. The feeds of the saddle are automatic in both directions from one-twentieth to eight-tenths of an inch, and of the octagonal cutter bar horizontally one forty-fourth to one-fourth of an inch. Hand adjustments are also provided for the lengthwise movement of the octagonal bar and for the tool box slide, for which the means will be apparent from the illustrations.

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A Large Gear Cutter.

The accompanying half-tone represents a gear cutting machine of unusual size, which has recently been added to the equipment of the Newton Machine Tool Works. Its capacity is such as to swing gears of 12 feet diameter, and the machine is thought to be the largest of its kind in existence.

Its general design will be apparent from the engraving. The extension of the bed to the left beyond the stud for carrying the gear is for the purpose of supporting the upper end of the stud by a knee brace between it and the bed, this brace being used when cutting pinions of coarse pitch. When cutting larger gears a screw jack is placed under the rim to prevent vibration and chatter, but with small pinions this is impossible and the knee brace is provided as a substitute.

The machine is semi-automatic only, the feed and return of the cutter being attended to by the machine, but the indexing being done by hand. On work of the size for which this machine is intended, the advantages of a completely automatic action are, of course, small, and are not considered a sufficient compensation for the increased cost. The indexing mechanism has, however, a very ingenious feature which deserves description. Experience with such work has shown the chief drawback connected with hand indexing to be the liability to error, and the fixture referred to is intended to obviate this. The crank by which the index feed is made will be seen in front of the machine bed, near the middle. This is connected with the index worm by change gears, which are provided in such numbers and combinations that any number of teeth from ten to one hundred can be spaced with a number of exact turns to the crank, and to avoid errors it is only necessary to insure that the correct number of turns shall be made. The arrangement for accomplishing this, which is as simple as it is effective, will be understood from the outline engraving Fig. 2. The index crank *a* will be seen to have on its rear side a series of inclined grooves *b b b*. A stationary bracket *c* has a stop *d*, which can be adjusted lengthwise and secured in position by the nut shown. A slider *e* is fitted to *c* so as to slide thereon freely, but with sufficient friction to prevent accidental displacement, and the pin *f* is so placed as to engage with the slots *b b*. In operation the crank *a* is turned to the right and the pin *f*, entering the left hand slot, is carried to the right such a distance as to enter the second slot at the second revolution, this slot leaving it in position for the third slot, and so on until the pin has engaged with the last slot, which leaves it in the position *f'*, where at the next revolution it stops the crank from further motion. When feeding for the next cut the slider is first pushed back to the stop *d*, when it again counts the required number of turns and stops the crank when they are completed. By adjusting stop *d* on the bracket, more or less of the slots in the crank can be cut

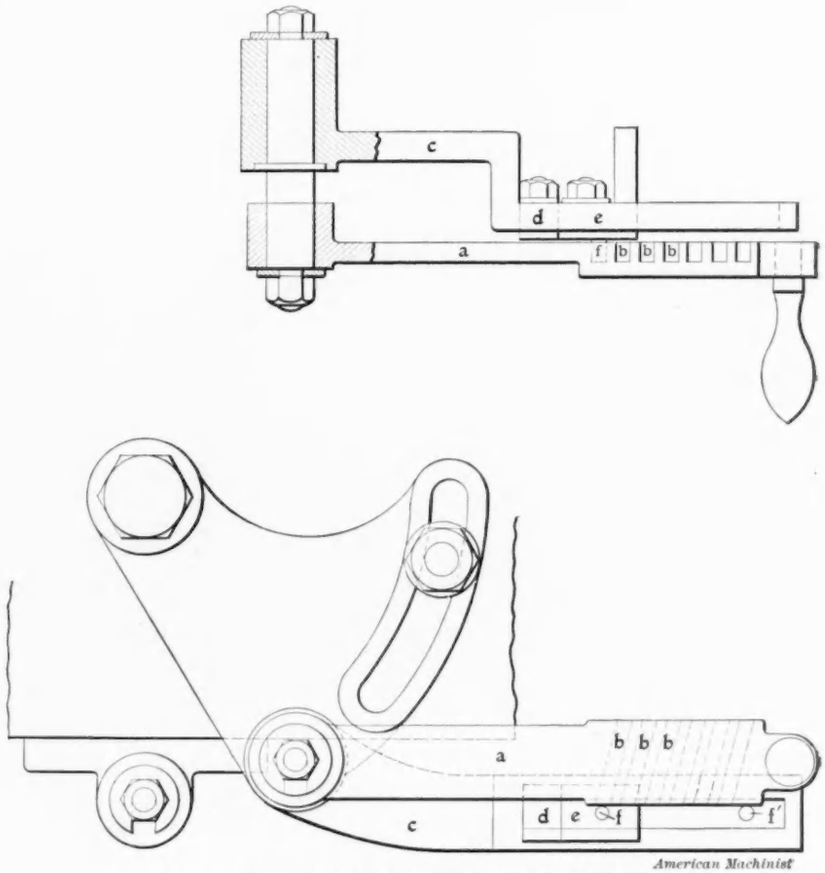
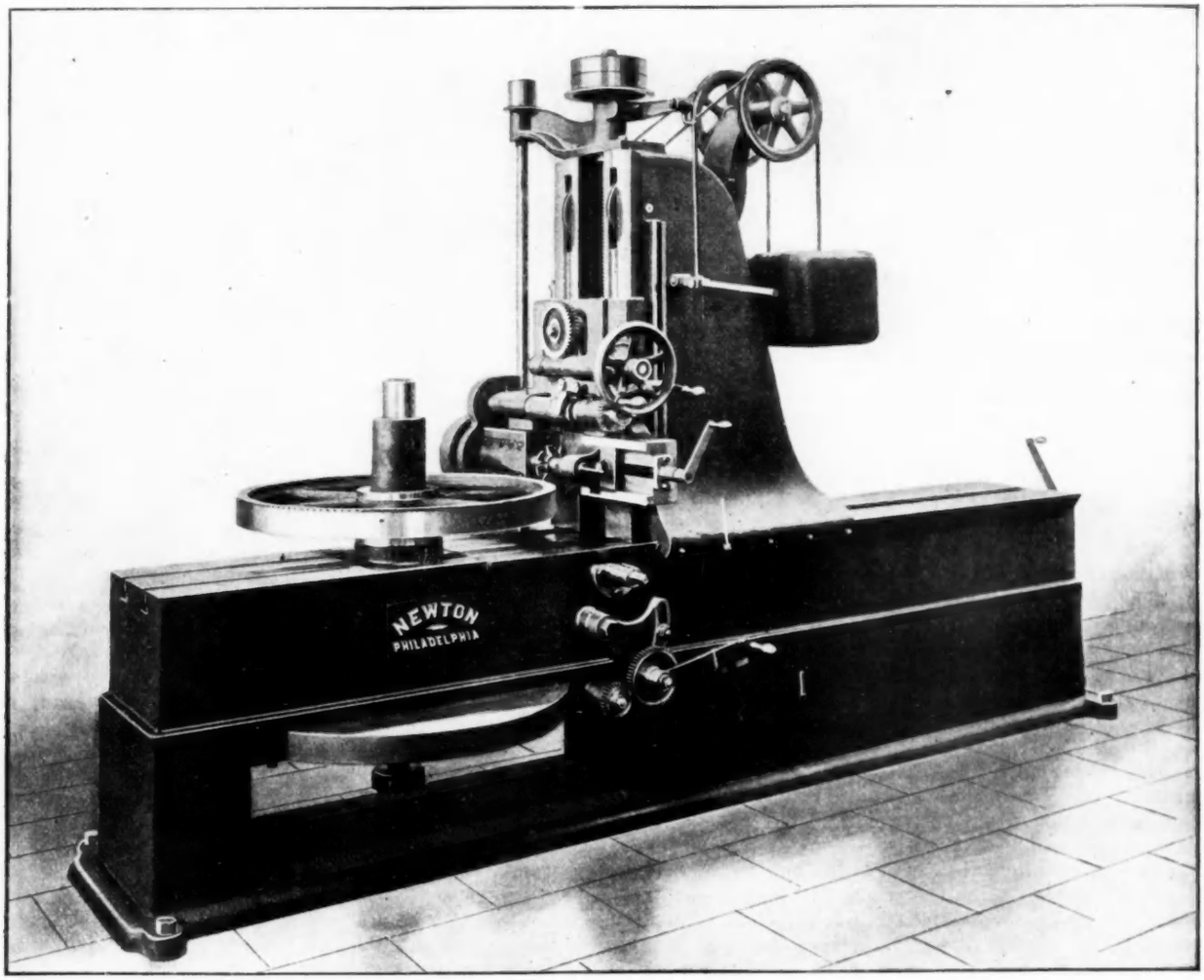


Fig. 2. INDEX MECHANISM OF GEAR CUTTER.

out of action and any number of turns be counted from one up to the full number provided for.

Special effort has been made to provide stiffness in the cutter spindle, which is carried through its bearing without a collar at the cutter end— end motion being prevented by collars at the other end. The projecting end of the spindle is also made as short as possible, the journal cap being cut away, as will be seen, to enable the wheel being cut to clear it when the cutter is close up to the journal.



A LARGE GEAR CUTTER.

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Practical Tempering of Steel.*

BY W. B. BRAUCHER.

The peculiarities of steel, which will be briefly described in this paper, were first noticed by the author seven or eight years ago, while working with several kinds of steel in the same set of knives, which were being re-sharpened and hardened. There were two or three kinds of tool steel—some made and stamped by Jessop & Sons—and common buggy tire steel. They were not affected alike upon being plunged into the hardening bath at the same apparent heat. It was also noticed that the thin knife edge would become brighter after it had cooled for a time.

Upon closer examination and comparison made in the dark, of one kind with another, a difference was found in the several brands in the action of cooling. The tool steel in cooling from a bright red, would gradually become darker to a certain point, then suddenly become much brighter, and then gradually cool down and become dark again, the pieces being so thin that the variation was quite noticeable. The tire steel in cooling would become much darker before it brightened, then it would gradually change its red by flashes, getting darker each time and then a little brighter, seeming to light up a few times after becoming invisible in the dark.

In hardening, the tool steel acted in a similar manner, sometimes hardening at a cherry red, and then it would soften at a bright red, while the tire steel hardened at a very dark red or even black.

This was puzzling for a time, but the observations suggested the thought that possibly there existed a fixed relation between this reheating of steel and its quality of hardening, and started the question of finding out the causes and conditions. The author has shown to a few persons the fact that steel will reheat after cooling for a time. They reluctantly admitted the fact after observing it once or twice, although refusing at first to consider it possible. A traveling salesman for Crescent steel said that he would investigate it further when he returned to the laboratory of the Crescent Works. Afterward there was noticed an article upon "The Recalescence of Steel," which appeared in "Sparks." Others may have observed these facts, though nothing else on the subject has come in the author's way, and this paper may lead some one who is in a position to make experiments, to interest himself in the subject and develop valuable information as to the proper treatment of steel.

A few questions may not be out of place here.

Why does steel reheat on cooling? Be-

* From the "Technograph," published by the Engineering Societies of the University of Illinois.

cause in being heated it absorbs heat that is not used in raising its temperature, which may be called latent heat.*

What would the latent heat signify? That some internal change in the structure of the steel must take place when it is heated above the point where the latent heat is absorbed.

What change in the steel is caused by the latent heat? We don't know, and can only theorize as to that. It may be a chemical change, or a rearrangement of particles, or a change from the graphitic state of carbon to the combined state, or some other change.

Why should steel be heated slowly? Because it takes time to absorb its latent heat, and this must be allowed for.

What would be the effect of heating steel quickly? If the piece is large, the outside surface could be heated to the burning point in less time than is required for the whole piece to absorb its latent heat, as each layer takes some heat from the next layer inside, thus reducing its temperature below the point at which absorption can take place, and making it necessary to transmit heat to each successive layer several times.

What would be the effect of forging steel that has been heated rapidly? If it should be forged before it has completely absorbed its latent heat, there is danger of making checks and flaws which will be apt to show when the piece is hardened and thus may ruin the work.

Instructions for hardening and tempering steel usually refer to "cherry heat" and "cherry red." It is suggested that "hardening heat" would be a better term. If cherry red is a definite color it would be very unsatisfactory to work by in hardening steel, for the reason that the "hardening heat" is not, by any means, the same color in different steels. Again, it is the best practice to harden at as low a heat as possible. If the lowest heat at which a given steel will harden is called "cherry red," we find there is another heat the exact duplicate of it in color, but if the steel is plunged at this duplicate heat it will soften. It could be hotter and still soften.

How can the "hardening heat" be discovered for a given steel? Heat the piece until the scales begin to loosen, then hold it in a dark place and watch it cool. It will harden if plunged at this heat, or at any heat greater than that at which the latent heat becomes sensible, but of course the danger of flaws is increased at the higher temperatures. Note how long it takes to cool to the point at which the latent heat becomes visible and how low or dark red the steel becomes just before the latent heat becomes sensible. The color is only relative and depends on the light where we are observing the changes, so that the best results are obtained in a shaded or darkened place. We thus find the law of heating and cooling of the brand, and by remembering this as nearly as possible we heat and harden the steel, plunging into the bath just before the time for the latent heat to become sensible. Let it be understood that unless some tempering bath is used, the tools require drawing to the proper temper in the ordinary way.

The action of the forces within the steel to produce hardening might be explained theoretically as follows: Plunging in water accelerates the rate of cooling, and the outer layers of steel would be cooled so suddenly that they would pass their period of latent heat and contract upon the next layer just as it was being heated and expanded by its latent heat becoming sensible, and so on to the center. These intense forces act upon the particles in such a way as to compress them, making them dense and hard. Or this severe compression might produce enough extra heat to prevent the transformation of the combined carbon back to the graphitic state, thus leaving the particles in the hard state instead of soft.

A few trials have been made with self-hardening steel and it was found to possess some of the qualities of other steels. It will harden in water and also soften slightly, but the hardening heat is much lower than with other steels. On cutting some partially chilled casting it was found that the tool stood the work much longer and cut cleaner if hardened in water. Not much attention has been paid by the author to the action with self-hardening steel.

There has always been more or less mystery about the working of steel, and it seems that this mystery is vastly increased and darkened by our competitive system of doing business, which compels a man to hold as trade secrets many, if not all of his most important discoveries, hoping that he will thus derive an advantage that he is not willing to share with his fellow workmen. In this way some of the most valuable compositions and processes are kept secret to the use and profit of a few men, while the people at large are deprived of benefits which should accrue to them, as well as the opportunity of making further progress founded upon the knowledge thus derived.

The above method of treating steel has been used by the author for several years with good results.

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Electrically welded barrels are coming into extensive use in Europe, especially for oil and other liquids. Splendid drums they must make for the boys, when empty, and possibly boilers for amateur engineers. Other uses will doubtless develop later.

* Recalescence of steel is not generally known among practical men. It was probably first noticed by W. F. Barrett in 1872, who published the results of his experiments in "Phil. Mag.," Vol. 46, Dec., 1873. A very full discussion is found in the article by J. W. Langley in "Jour. Assn. Eng. Societies," Vol. 12, April, 1894.—Editors.

Notes on Rolling-Mill Designing—III.

BY A. RANDOLPH.

Bar, Billet and Shape-Mill Details.

The accompanying drawing shows a general view of the brasses, carriers and chucks in position in the housing, the view being of the inside of the housing toward the body of the roll. Other views of the same details are shown; also the screw and its nut, and a side view of the roll neck or journal with the "wabbler."

The unit for proportions is the pitch diameter of the rolls U, and the following table of proportions refers to letters on the drawings:

$A = U \times .5.$
$B = U \times .09.$
$C = U \times .6.$
$D = U \times .125.$
$E = U \times .025 + \frac{1}{4}.$
$F = U \times .085.$
$G = U \times .16.$
$H = U \times .2.$
$J = U \times .5.$
$K = U \times .05.$
$L = U \times .3.$
$M = L \times 1.87.$
$N = L \times 1.54.$
$O = U \times 1.26.$
$P = L \div 6.$
$R = U \times 1.5.$
$S = L.$
$T = U \times .55.$
$V = U \times .6.$
$W = U \times .125.$
$X = U \times .05 + T + E.$
$Y = P \times .65.$
$Z = P \times .35.$

Note.—Where this table gives results in inconvenient fractions, the nearest 1-16 inch may be used for sizes less than 1 inch, and nearest ⅛ inch for larger sizes.

The lugs on the brass for the bottom roll must be long enough to place the set screws at Q far enough from the center of the roll to prevent their jam nuts interfering with the coupling box on the driving end of the roll. Some designers prefer putting this brass in a carrier and adjusting the carrier, as is done with the upper rolls; but this is more expensive, is not so solid, and is not necessary if the brass is properly designed. In small mills the chucks are often not used, in which case the brasses are each made to envelop one-third of the neck circumference, as shown at the bottom neck. The brass should never be made to cover more than that amount of the neck, for if it does, it is liable to overheat and seize the neck. When chucks are not used, there is more friction, because when rolling in the bottom pass, the pressure is transmitted to the adjusting screw through the brasses and neck of the top roll. It is best to have side brasses on all the necks, as it is much easier to keep the rolls in line by suitable liners behind these brasses. It pays to make the brasses of the best quality of material for wear, for

the duty on them is very severe; but the side brasses need not be as good as the top and bottom bearings.

The carriers, chucks and riders are usually made of cast iron. The breaker is so called because it is intended to be made weak enough to break and relieve the rolls if anything goes between them that would break them. It is made of cast iron, and the proportions vary considerably in practice; but the general proportions shown will do for a start, keeping in mind the fact that it must not be so strong that it may not break before the roll does. The side brasses in the chucks are kept from coming out by a clamp at the end secured by a screw tapped into the chuck. It may be remarked here that mill engineers consider it very important to avoid the use of screws tapped into the large castings about a mill, and in all cases where adjusting screws are used, a nut, seated in a cored pocket, is used instead of tapping the casting, so that when a thread fails another nut can be easily put in. In all cases where practicable, through-bolts or T-headed bolts are used, to avoid the delay and difficulty of getting broken screws out of tapped holes. If a casting must be tapped, it is best to use a stud in place of a tap bolt, and make the end that goes in the casting a size larger than the nut end, so that if screwed up too hard it will break off close to the nut, instead of at the surface of casting.

The main screw *L* should be made of steel of as high carbon as can be threaded in the lathe without annealing. It must have a very free fit in the nut, so that it may not get tight if it should be compressed slightly beyond the elastic limit.

At *P Y Z* is shown a section of the thread for this screw, and it must be cut with the slope side next to the point of the screw, so the thrust will come against the square side of the thread. The nut is made of wrought iron, and by some is made a tight fit in the housing at *M N;* but others prefer to make it fit easily in the housing, and secure it from turning in its seat, by a feather at the lower end secured to the nut, and fitting easily to a key-way in the housing. The top nut *W* is cast iron, and should have a thread fine enough, so that it will draw the main nut up securely in the housing. The brasses must, of course, be all bored to fit the fillet *K* on the roll neck, and the dimension *X* is always made greater than the length of the brasses, to keep the coupling box from rubbing against the ends of them.

All surfaces requiring a tool finish are marked *f* on the drawings.

FEED ROLLS.

Mills of 18 inches diameter and larger usually have feed rolls to assist the operator to enter the piece in the pass. A single roll is used to each pass, and is placed so the weight of the end of the piece rests on the feed roll, which is driven in a direction to drag the piece toward the pass. The roll is the smallest diameter at the end next to the large passes, and largest at the finishing end; the proportions being about $U \times .25$ for small end, and $U \times .5$ at large end. The body is same length as main roll. The spindles are about $U \times .125$ diameter, and are fitted to a bored taper hole in the end of the roll, and prevented from coming out by a pin through the diameter.

The lower feed roll is carried in bearings bolted to the outside of the housings, and is outside of the fore-plate. The upper feed roll should be placed closer to the main rolls, so that when the piece is lifted from bottom pass to upper pass, it will not need to be pulled out much to get the end past the feed roll. Enough room, however, must be allowed between the feed and main roll to get in the entering guides.

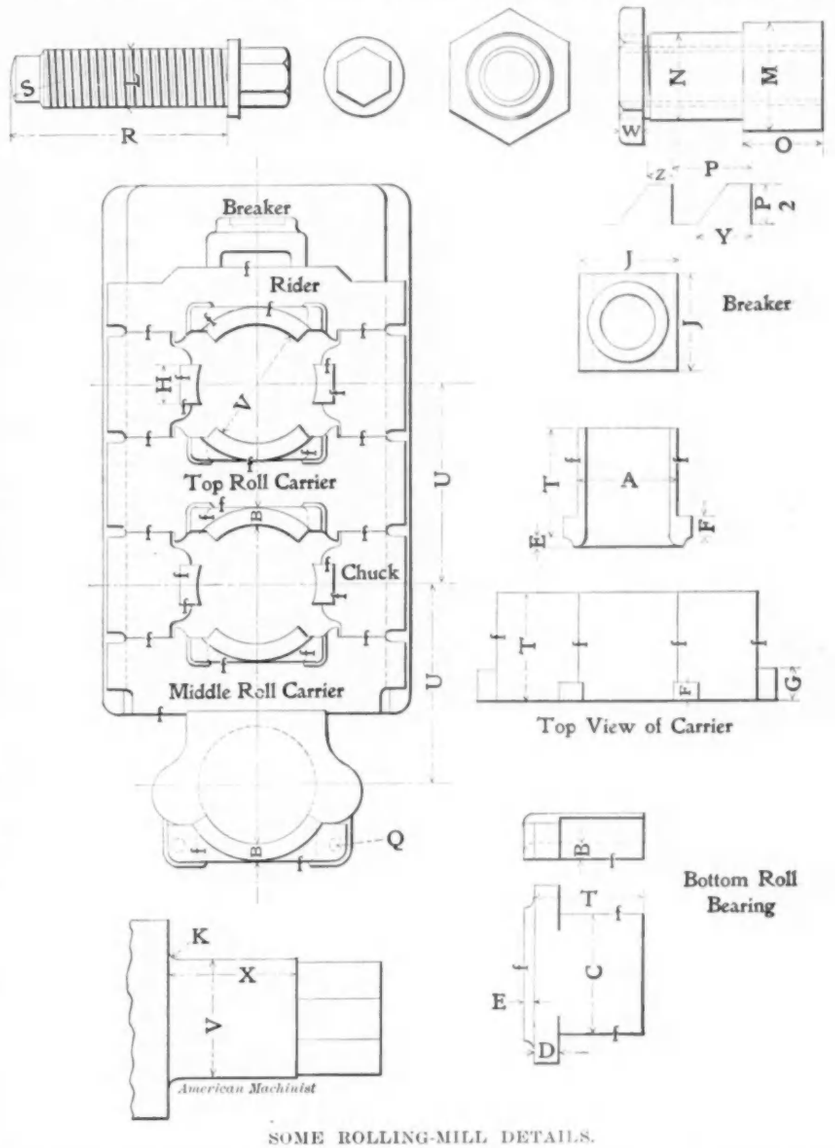
The surface velocity of feed rolls should be about the same as that of main rolls, and they are driven by a sprocket chain or belt from a bottom and middle coupling box. A belt is preferable to a chain, so if any accident stops the roll, the belt will slip, and no harm is done.

Two-high mills have only one feed roll. No proportions can be given for fore-plates, guides and pass guards, for the shape and proportions depend on the sort of shapes being rolled, and to some extent on the ideas or whims of the roller, and these details are often not made until the mill is erected, when the roller, pattern-maker and blacksmith will try and find out somehow, between them, what is wanted, and make it.

If necessary to make fore-plates, guides and guards without knowing who will be the roller, it may be done by consultation with an intelligent roll designer; but I have known thoroughly practical details so made, to be thrown away and others made to suit the roller.

To the beginner in mill designing, I strongly advise consulting freely, if possible, with a good roll designer, for I have received much valuable aid from such men.

Salem, O.



SOME ROLLING-MILL DETAILS.

The Place of Our Destination—XIII.

MORE ABOUT THE STOCKHOLM EXHIBITION—A HIGHLY FINISHED CORLISS ENGINE — SWEDISH WOOD-WORKING MACHINERY—SWEDISH LOCOMOTIVES —WORM GEARS—A ROTARY ENGINE —A HIGH SPEED REDUCTION GEAR— MACHINE TOOLS—A NOVEL BICYCLE.

Editor American Machinist:

To continue the notice of the tools at the Stockholm exhibition, that of the Atlas Works, of Stockholm, is perhaps the more extensive, but that of J. & G. C. Bollinders, as an exhibit, is the most interesting.

To begin with, they exhibit by far the most highly finished engines of the Corliss type I ever saw. The outside of the cylinder maintains its cylindrical form throughout, and the valve chambers are also cylindrical, and appear as if bored through the main cylinder. This makes a very complicated form to jacket, and yet the whole is jacketed with mahogany and bound with silver or nickel bands, and the whole finished up to the degree of pianowork. I do not believe in cabinet-work for a steam engine, but if one is to have it and put it on to sell the machine, this jacket ought to sell a half dozen. Otherwise the engine is pretty nearly up to the jacket in finish.

They also show various upright engines, compound and single cylinder—one large enough for a warship; gang saw-mills, and some of the best wood-working machinery I ever saw. The Swedes have always been at the head in wood-planing machines; but as I am promised photos of their planing and other machines, I will leave the description of them for separate articles; but say here that their largest machine is guaranteed to plane 100,000 lineal feet in a day, planing all four sides, and smooth planing the face at the same time.

So far as I was able to judge from the forests of Sweden and the logs at the saw-mills, all the timber there, as well as all over Europe, is made from comparatively small logs. When this is the case, a large part of the lumber has a good and a poor side. All the Swedish planing machines are made to treat this lumber in the right way, and that is just as a joiner would do—plane the best side first, taking off as little as possible, and making a face that runs on the bed of the machine. Then follows dressing the edges, and the poor lumber is dressed off to bring the piece to thickness. If the piece does not hold up to thickness, it is the back that is left rough. Mr. John Richards has been for thirty years trying to hammer this simple piece of common-sense into the heads of the American builders of wood-working machinery, but it is only recently that a firm with some German element in it has been converted, so far as I know. While the American builders have been ignoring the merits of this feature in the Swedish machines, the Swedes have been picking up the good things in the American wood-working machinery and improving on them. I wonder if it has been entirely a moral sentiment, that our people have not adopted the Swedish plan for fear they would be charged with stealing Swedish designs. As they are known to charge each other with stealing designs, that may be it.

The Atlas Works show a locomotive very like the Shaw locomotive shown at the Railroad Exhibition at Chicago several years ago. At that time it was thought to be an invention that never need to have been made, but as its object is to balance the machine without the hammer blow on the track, it may be a better way to reach 100 miles an hour than the various electrical plans now being promoted to accomplish that end. It consists of two cylinders on each side, with their pistons working in opposite directions at the same time. One piston balances the other and one crank balances the other, so that no counterbalance in the wheels is required. As some of the compound locomotives use two cylinders on each side, perhaps some master mechanic will combine the double-cylinder compound with the Shaw notion and reach the 100-miles-an-hour speed without much additional cost and with steam economy, for steam economy must almost be a necessity with high speed and long runs.

There is also another locomotive shown by the Atlas Company, outside connected with valves between the cylinders—quite an unusual type—and another with the valves on the upper outside quarter with two pairs of small eccentrics hung on the outer ends of the crank pins. It has the advantage of small eccentrics, but would be bad in a smash up. I hardly think they lay much stress on smash ups. They also show a marine engine and a string of small uprights, together with a pretty complete line of regular machine tools—a horizontal boring machine, quite like the one shown by the Koping Works, and a gear cutter for cutting spur and worm gears, such as promulgated by one of your correspondents to cut with a single-tooth cutter.

As there has been, in the "American Machinist," during the last year, a good deal said as to how and how not to make a worm gear, I venture to insert in this place the result of one of my blunders. In 1864 or 1865 I was delegated to make the plans for a roll lathe, and with a worm-gear drive. I do not know whether the worm-drive idea was my own or my brother's; however, I had to lay out the worm wheel which had the teeth cast in. I knew enough to know that if I made it with a straight face and the teeth at the proper angle, the worm would only bear in the middle of the teeth, and I also knew that if I scooped it out to fit the worm and made the pitch at the outer edge, that the worm would only bear at the two outer corners. So I decided on a compromise, and made the teeth as if hobbed with a hob twice the diameter of the worm. Both the worm and gear teeth were drawn by the Willis odontograph, and the worm wheel had the proper pitch at its small diameter. When put to work, it showed a very good contact. Neither the worm nor the wheel ran in a pan of oil; it never got oil except from a squirt can, and it ran about thirty years constantly, perhaps a quarter of the time night and day; was in good condition when sent to the scrap heap to give place to a new machine with the gear fast to the face plate, the same pattern being used for the worm gear as before. For durability and free running (which is about all that is wanted, except looks), I doubt if anything much better can be done, unless it is to make a plain skew tooth spur gear and set the worm at an angle like the Sellers planing machine system, which never does wear out. The two extreme systems are the Albro-Hindley worm and the Sellers. The one aims to get the greatest wearing surface possible, and the other only a line contact, and have that line constantly changing on both surfaces. I do not know as to the relative friction or endurance of the two, but knowing the disposition of nuts and screws to wear (and they must fit as well as it is possible to fit the Hindley worm), my notion would be that the Sellers is the best—for that the one that lasts the longest runs the easier of the two, goes without saying.

M. Kout, Jr., exhibits a monster modern compound locomotive, inside connected and elegantly finished in every detail. The link is shifted with a quick pitch screw; sliding fire doors, which will not blow open when a flue blows out. The throttle can be operated from either the engineer's side, which is the left, or by the fireman. The feature that struck me the most forcibly was the construction of the tender. It is somewhat on the English plan, but more so. The water tank is in the bottom, and coal is carried over it in a hopper-shaped structure, the hopper sloping so as to deliver the coal on a plate right at the hands of the fireman and about 16 inches above the foot plate. So long as the pile of coal is not above the cab, I cannot see any reason why it should not be up where gravity will bring it to the fireman, as well as to have him travel all over the tender for it.

D. Hald & Co. show a new rotary engine, of which I enclose a cut. As I make out from the circular, it is the invention of Broderna Hults. It is of the eccentric-cylinder sort, as will be seen, and the improvement consists in rotating both the inside cylinder and the outside shell at the same time. This eliminates one of the bad features in engines of this class (of which there have been more invented than of all other classes put together). It reduces the friction pretty

nearly down to that of the journals. The cylinder rolls instead of sliding inside the shell; the abutment has no friction except that of sliding out and in, and the little travel due to the difference in the length of the two surfaces—in fact, if there was any hope for the success of engines of this class, this is just good enough to give some encouragement. It does not get over the fundamental defect—too much condensing surface for the power. It requires large journals, has an enormous side pressure on them, has to have a cut-off and governor, and when one gets through with one of these engines he finds he has about as much machinery shut up in a box as he wants. It will be seen from Fig. 3 that he has introduced hollow anti-friction rollers to take the side thrust from the journals. Many of your readers will remember my suggestion, to use these anti-friction rollers in connection with the traveling table of our traversing machine. Had we found it necessary and made them, it would have anticipated this patent, and, had the claim been properly worded, anticipated all elastic rollers. How rich one might be if he could catch fortune on the wing!

There is also shown by model, and in connection with a milk separator, a silent high-speed gear for driving light work and reducing the high speed of rotary engines, which is likely novel and good. It is shown in Fig. 4. It is simply a planetary friction gear with the friction made by the elasticity of the planets. Three rollers working inside the three rings give the required motion to the second shaft.

Munktells exhibits lathes, planing machines and a shaper with the knee hooked on the ways on the column by square ledges in place of dovetail (which is just half right), and all sizes and kinds of twist drills and reamers of a peculiar kind. As I see these reamers in different places, perhaps there is something good about them. They have first a leader about one diameter long, then a short thread like those on the end of a Cleveland Twist Drill Company's reamer, then a slight taper up to full size. The flutes are right-hand spiral instead of left-hand, and the flutes narrow down at the end where all the work is done and widen above—exactly the reverse of what one would suppose necessary for chips.

The "Svea" velocipeder is a remarkable departure in bicycles—remarkable in having a lot of ingenuity in it and in having been sold to an English syndicate for $625,000, the latter by far the more remarkable of the two. The rider operates bent levers which, by cords, communicate motion to eccentric sheaves which clutch to the hind axle. By touching buttons in the handle-bar, the leverage is increased for hill-climbing, and by touching the same buttons again when the lever is in the back position the leverage is decreased again for speed. By pressing on both pedals it puts on the brake. Just how all the motions are worked out would take good drawings to show and a good mechanic to understand. The thing, on the face of it, resembles the Barnes foot-lathe motion, but is half-past nine times better.

JOHN E. SWEET.

▲ ▲ ▲

In England they sell gas by the pennyworth, which quantity will heat 30 gallons of water for a bath, or make tea for 64 persons, work a 1 horse-power gas engine for an hour, melt 10 pounds of iron, or give a 50 candle-power light for nine hours.

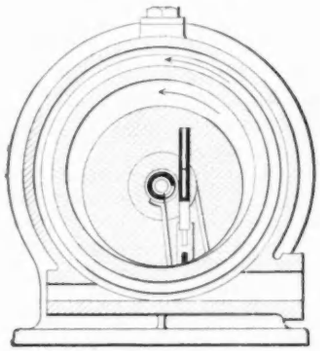


Fig. 1

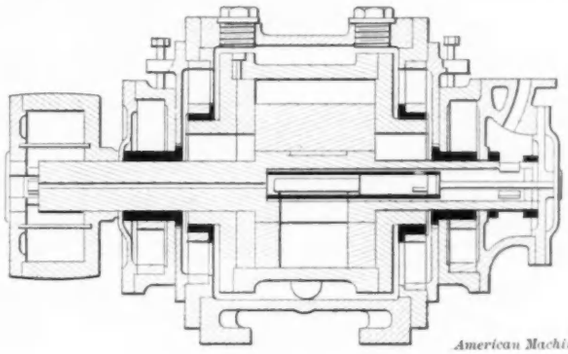


Fig. 2

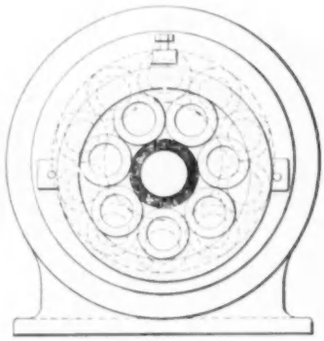


Fig. 3

THE HULTS' ROTARY MACHINE.

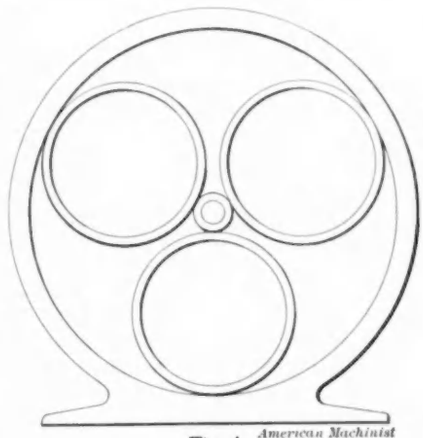


Fig. 4

SPEED-REDUCING GEAR.

The Wedderburn Disbarment.

The report of the Commissioner of Patents on the disbarment of Wedderburn & Co. is extremely pungent and interesting. It is difficult to make extracts from it without exceeding our limits of space. We, however, make room for a few, as follows:

In a nutshell, the charges are that the respondents, as solicitors, practicing before the Office, concocted a scheme and plans to impose on, deceive, and defraud unsuspecting, unwary persons throughout the country by a system of advertising and correspondence which was false in suggestion, misleading in fact, and fraudulent in tendency and purpose.

* * * * * *

The very essence of the offense is the methods and agencies employed and the manner of their employment to mislead and entrap the unsuspecting, doubtless in the belief that the victims of the deception are helpless without remedy, and that the vast sums of money realized will enable the delinquents to secure immunity and pay for hunting down any official or citizen who calls the delinquents to answer for their offenses.

* * * * * *

As is known, large fortunes have occasionally been made out of patents. Sometimes devices seemingly simple and inconsequential have proved very valuable to the inventor or owner of the patent, but these instances are, like angels' visits, very few and far between.

* * * * * *

By well-contrived, false and delusive suggestions and misleading statements, thousands of men and women in various parts of the country have been induced by the respondents to part with their money in the belief that an opportunity to make a fortune awaited them if they could invent some improvement on an attachment for a rocking-chair, a chalk sharpener, washing machine, buckle, butter and cheese cutter, or any one of the thousand things used on the farm, in the shop, factory or home, and with reference to which an improvement in the shape of a change or modification could be made

from the precise thing these would-be inventors were in their experience accustomed to use; and they were also invited by this same advertisement and circular to enter the lists for the $1,800 Wedderburn prize, it being false that an $1,800 prize was offered, except in the advertisement.

* * * * * *

This communication reaches some farm, store, blacksmith's shop, sewing girl's room, or wherever the unpretentious but struggling inventor lives, and he or she, as the case may be, takes it for granted, of course, that if the device was *not* patentable, or if it were *not* a wise expenditure of money to file an application, the trusted solicitor who has said so much about his capacity, experience, purity of motive, and utter devotion to his clients, and has so earnestly cautioned the struggling inventor against patent sharks or unscrupulous sharpers, would, in the conscientious discharge of his duty as an attorney, so advise the client.

* * * * * *

If the position taken by counsel is correct, and it was so proclaimed to the world, it would result that within six months every city in the United States would have an organized combine of confidence men, guided by unscrupulous attorneys, plundering the unsuspecting members of the community by representing that they could at small cost obtain from the Government something of great value; and as a result the cutpurse could with advantage leave his calling, and the footpad abandon the road, and both seek an easier and safer method of obtaining money by prosecuting business with several Departments of the Government.

* * * * * *

Another result must be that our penal institutions may become kindergartens in which to train solicitors to represent claimants and petitioners before the several Government Departments.

* * * * * *

The Office cannot, without bringing lasting reproach upon itself, permit the continuance of such deliberate and systematic deception of inventors as is clearly shown upon full and fair investigation to have been practiced by the respondents. The duty of this Office toward inventors and the public imperatively demands that the attorneys practicing before it who are shown beyond reasonable doubt to have been so utterly false to their obligations toward this Office and toward their clients, so utterly false to professional honesty and fairness, so utterly false to even common decency, should no longer be permitted to be recognized.

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The latest record of the Turbinia is said to be 35 knots or 40 miles per hour, with a steam consumption of 14 lbs. per I. H. P. The horse-power, however, was enormous for the size of the vessel.

Comparative Test of Roller Bearings

An interesting test was recently made by the Union Railroad Company, Providence, R. I., to determine the saving in power, if any, by the use of roller bearings for the car axles, as compared with the solid bearings ordinarily in use. The route traversed was approximately ten miles.

Car No. 7 was equipped with the diamond truck and Hyatt roller bearings, and car No. 9 with Menear truck and solid boxes. Both cars had been in constant operation for several months, the test being made without cleaning or special lubrication of any kind, the object being to make the comparison in such a way as to determine the relative amount of power consumed in every day use.

Both trucks were made of G. E. 1,000 motors, approximately 30 horse-power, of the same type, the efficiency of each for this purpose being assumed the same under the same load. Each car was run the same distance, over the same route, at the same time of day and operated by the same motor-man.

The instrument used was what is known as a Thompson recording watt-meter of high efficiency. The fixed coil of this instrument was placed in series with the motor, the movable coil in parallel, care being taken that the heat and light circuits were cut in on the trolley side of the instrument.

At one part of the route selected there is a down grade followed by a short up grade, the end of the line being some 60 feet from the top of the incline. A comparison of the freedom of running of the two trucks was made by stopping both cars at the top and allowing them to run freely without power. Car No. 7 would be able to not only run up the incline, but it was found necessary to set the brakes hard in order to stop the car at the end of the route, while with car No. 9 it was necessary to use power in order to complete the ascent.

The superiority of the diamond truck in regard to ease of riding and freedom from jar was marked, in fact, comparison showed it was impossible to attain nearly as high a rate of speed with No. 9 as with No. 7, the former having a tendency to leave the rails.

An attempt was made to determine the difference in power required to run the car up the incline before mentioned. Several observations were made and the average result may be found in the table. A comparison of the power necessary to round a curve was also desired, but it was found to be beyond the range of the instrument.

It will be seen from the table that the total numbers of stops differ by a small percentage, the comparison of the number of stops for each trip showing that the conditions were very close, this being considered important, as it was believed the energy required to start the car was considerably less in the case of No. 7.

The number of passengers carried differs by only 10 per cent., and the running times of the different trips were found to be almost the same.

The power consumed has been given in horse-power hours, as well as in watt hours. The saving has been reduced to a percentage of the total power used, as it is believed this is the most satisfactory for the purpose of calculating the saving for any size equipment; it has also been left in watt hours and watt hours per mile, as well as horse-power hours and horse-power hours per mile. It must be remembered that this is the actual saving on the road, the saving in the power-house being still greater by the decrease of loss of transmission from dynamo to motor. Observations were taken on several cars, and practically the same result found. It is believed that this is a fair comparison of what may be expected in everyday use. Below will be found the result:

	No. of Car. 7	9
Number of miles run.....	30	30
Number of passengers carried	281	254
Total number stops made.	214	201
Factor of instrument....	10	10
Difference in reading....	2,629	3,024
Power consumed, watt hours	26,290	30,240
Average difference in reading between top and bottom of grade.....	41	46
Difference power consumed, watt hours.....	3,950	
Difference power consumed, horse-power hours.....		5.30
Percentage of difference.....		13.06
Difference per mile, watt hours.		131.6
Difference per mile, horse-power hours		.177
Amount saved, watt hours.....		50
Percentage difference.....		10.87

It will be thus seen that the saving in power by the use of the bearings in question was shown to be 13 per cent. of the whole power consumed. In ascending a grade, the result is shown to be 10.87, the friction on the journals being the same as on an average run, while the power necessary to raise the car being considerably greater, the percentage of saving would be correspondingly less.

Tests made at the Dorchester Avenue Station of the West End Railroad Company, of Boston, showed an average consumption of 3 pounds of coal per kilowatt hour. On the supposition that 200 cars are run 75 miles per day, the reduction in weight of coal used is 5,922 pounds per day, which, at $3 per ton, amounts to $3,242 per year.

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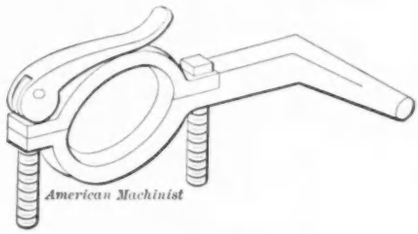
A woollen mill at Almonte, Ont., is to be run by compressed air as the motive power.

Quick Acting Lathe Dog.

The cut shows a quick-acting lathe dog which should be handy when handling a number of similar pieces, especially if small. Throwing over the cam lever to the position shown in the cut tightens the dog on the work, while a movement in the other direction releases it. The fine adjustment necessary may be made with the opposite screw, which for small sizes might have a round milled head, instead of requiring a wrench. This dog was recently patented by G. R. G. Wren, Philadelphia.



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A New Belt Tightener.

The recently patented belt tightener shown herewith does not seem to require a word of explanation. It looks like a cheap and handy rig, although it probably would not be serviceable for heavy belts. The patentee is W. L. Chipley, La Monte, Missouri.

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A Gliding Boat.

A "gliding" boat is a mechanical novelty which has lately been tried in England with considerable success. Two parallel hulls are connected by cross beams, forming a platform on which are placed the engine and boiler. The propeller shaft runs down obliquely into the water. Beneath the hulls are secured flat blades, extending from one keel to the other, and projecting some distance on each side. The flat surfaces of the blades incline slightly upward in front. When the engine is started the boat gradually rises to the surface, and when a speed of twenty miles an hour is reached, as was actually realized, only the back part of the blades touch the water.

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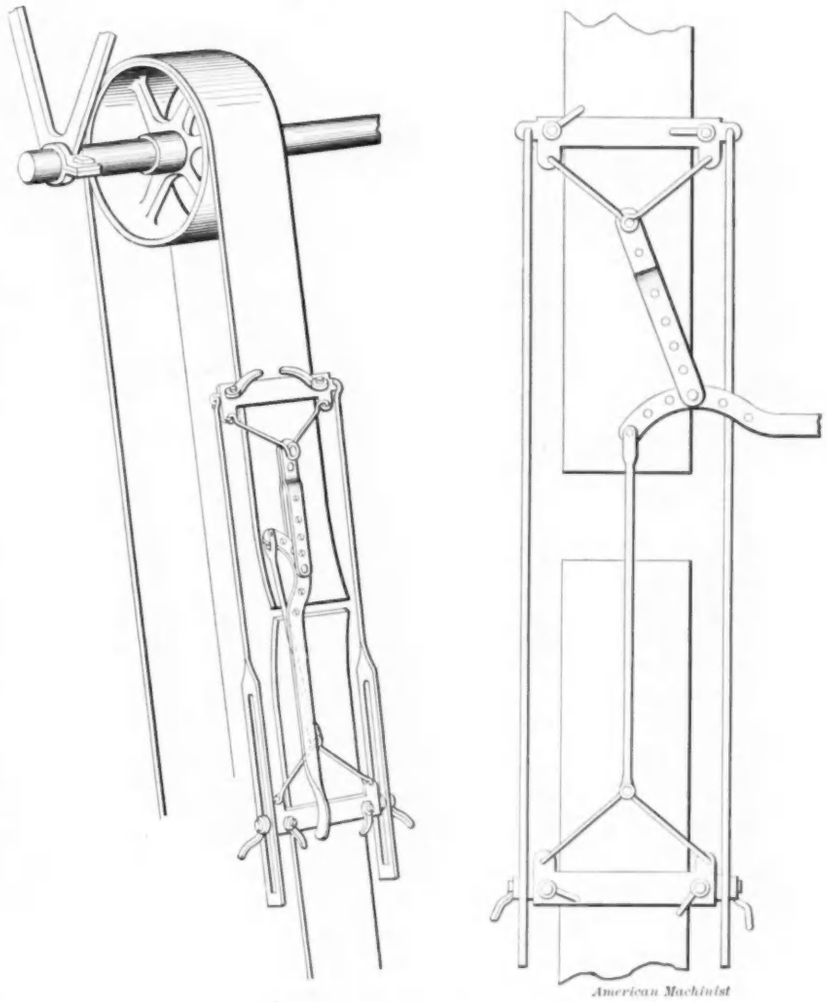
A New Process of Galvanizing.

At a meeting of the Franklin Institute on September 15th a paper was read by Mr. George C. Reese describing a new process of galvanizing wire. Enormous quantities of steel and iron wire are required to be "galvanized," or plated with zinc, and the long-established process has been to unwind the wire from one coil and wind it upon another, passing it in the meantime through baths or other means of chemically cleaning the wire, then through a long trough containing a large quantity of melted zinc kept constantly hot, and between wipers of asbestos or other material.

The process has always been a slow and tedious and expensive one, the objectionable features of which it is not necessary to enumerate. By the new process the wire is coated more satisfactorily than before and without the necessity of even unwinding the coils. The coils or bundles of wire are first cleansed by acid. The whole bundle is then dipped into the bath of melted spelter, and when it has received a thorough coating it is quickly dropped into the basket of a centrifugal machine. For small or light coils the machine may be already in motion, while for heavier wire it must be started after the wire is put in. The surplus coating is almost instantly thrown off from the wire, and an excessive speed is not required. The machine is stopped and the bundle of wire is removed as quickly as possible, and is jarred upon a block to prevent the wires from soldering together. Barbed wire has been successfully treated by the new process after it has been twisted into shape and formed into bundles. When wire is galvanized before being barbed and twisted, much of the coating cracks and peels off and the points quickly rust. Treated by the new process, the wire is more durable and retains its efficiency much longer. Wire cloth finer than eight meshes to the inch cannot be galvanized by the old method, while by the new process cloth of any fineness may be coated, if the speed of rotation is increased according to the fineness. Samples were shown of 12 x 13 fly wire 16 mesh, believed to be the first of the kind ever successfully galvanized after weaving.



A NEW BELT TIGHTENER.

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The School of Mechanic Arts of the University of Nebraska.

We have received a bulletin of the above named institution giving an outline of the object of the school and the course of study, which is of two years' duration and consists chiefly of mathematics, English, physics, political economy, lectures on mechanical practice, mechanical drawing and shop work. The requirements for admission are very simple, consisting only of arithmetic and English grammar. The bulletin gives interior views of the various shops and laboratories, which show that the equipment is excellent. It will be seen that the course of study is intermediate between that of a trade school proper and a full engineering course, to

which latter, in fact, it is intended to lead up. The student's expenses are very modest, tuition being free, and the total outlay for a year being estimated at $120.

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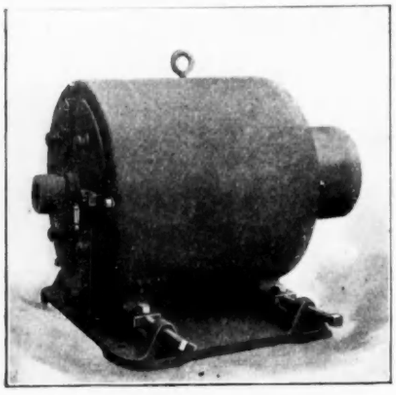
A New Electric Motor.

We illustrate herewith a recent design of electric motor in which construction, running and operating qualities, from a mechanical standpoint, have been given first place in the design. The half-tone shows the general appearance of the machine, which will be seen to be, in appearance, a mere drum with a shaft through it and a pulley at one end. The aim, in fact, has been to make a motor which should have all running parts completely enclosed, so that, in case of necessity, it could be set up out of doors, exposed to the weather, without protection other than that afforded by its construction, and to show its capacity to stand this test, the makers will set one up and operate it in this way at their factory.



A NEW ELECTRIC MOTOR.

Fig. 2 shows the construction of the field magnets and frame, which will be seen to be, externally, a simple drum-shaped steel casting with feet cast upon one side and lugs at the end openings, to which are bolted the end spiders carrying the bearings. These spiders, with the bearings, are shown in Fig. 3. The bearings will be seen to be of the ball and socket type. Such bearings would hardly seem necessary with the facilities for securing perfect alignment which the design affords, but electrical engineers usually call for them, and they have been provided on that account. The bearings will be seen to be self-oiling, and as an additional safeguard, glass gages are fitted to the oil cellars to prevent their being allowed to run dry. The circular form of the spiders enables them to be placed in any position around the drum, and by simply turning them in position, to bring the oil cellar on the bottom, the machine may be bolted down to the floor

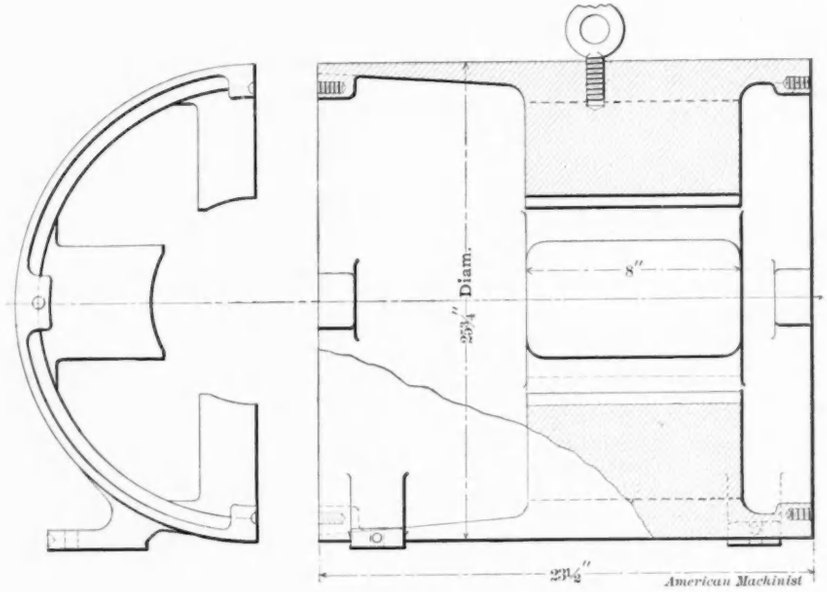
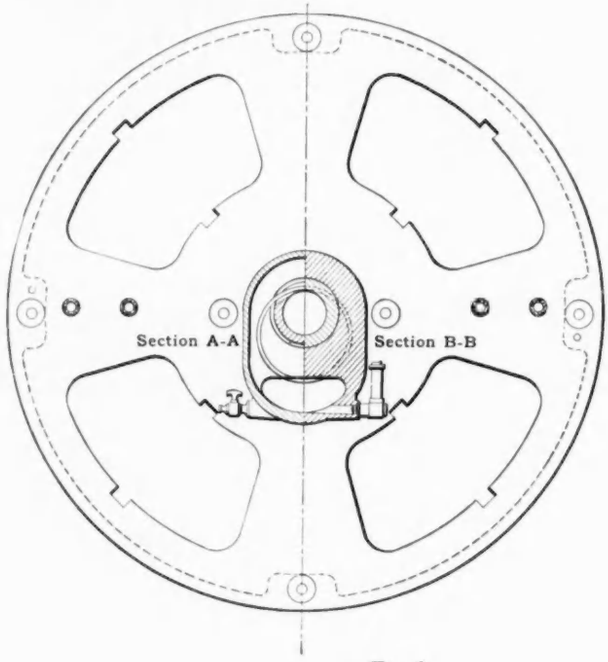


Fig. 2

FIELD MAGNETS.



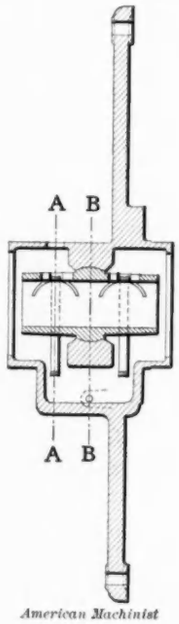


Fig. 3

SPIDER AND BEARING.

or suspended from the ceiling, or be secured sidewise to a post. Openings are provided through the spiders for access to the interior, but these are ordinarily covered with plates shown in Fig. 4, so that, except for the pulley, the machine is entirely enclosed. These covers are simple plates without catches or springs, the lugs cast upon the inner surface passing through the corresponding notches in the sides of the spider holes, when a short movement brings the lugs below the spider casting and secures the cover in place. With the cover plates in place, the rise in temperature, after a three hours' run under the rated load of the motor, is less than 50 degrees Centigrade.

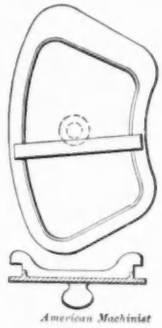


Fig. 4

COVER PLATE.

In order that the commutator may be

closed in in this way, it is necessary that no adjustment of the brushes should be required, which, in fact, is the case. The commutator is sparkless for all loads, which being the case, the makers take the bull by the horns and, in making the machine, adjust the brushes once for all, and then bolt the brush holder in place without provision for further adjustment. This sparkless running under variation of load is accomplished partly by the use of wide carbon brushes, and partly by the arrangement of the field coils, which are brought down practically flush with the ends of the field magnet cores. Since all the lines of force must pass through the coils, this location of the coils at the extreme end of the cores minimizes the effect of armature reaction in distorting the field, and thus keeps down the variation of position of the neutral point within the thickness of the wide carbon brushes.

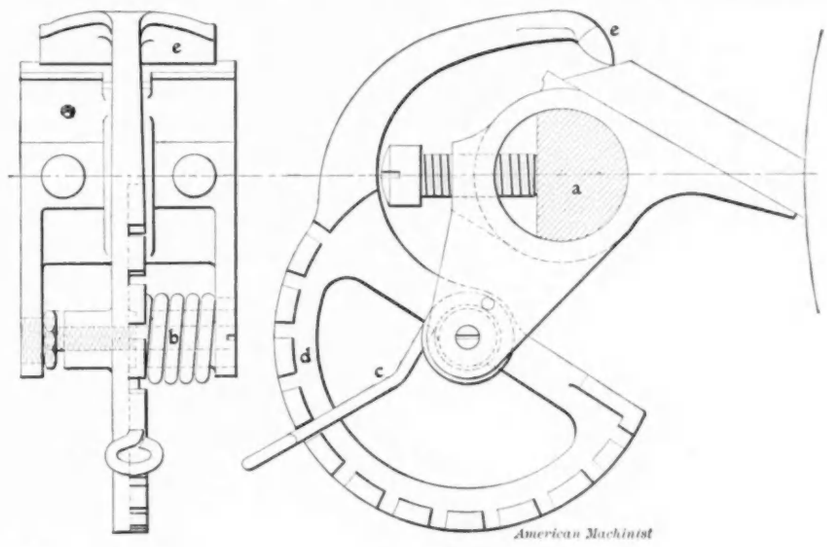


Fig. 5

BRUSH HOLDER.

Another outgrowth of the drum-shaped magnet frame is its easy provision for attaching reducing gearing directly to the motor, thus making the gearing part of the machine. Bearings for a shaft may be bolted to the drum in any position, and by a gear on this shaft and a pinion on the armature shaft the speed may be reduced in any ratio within the limits of a single pair of gears. With such a pair of gears at one end of the machine and a pulley on the second shaft at the opposite end, the machine is arranged to deliver a moderate speed at once without counter shafts or other outside devices.

A feature of all the dynamos and motors put out by the makers of this motor, and one which has been applied to this one, is the brush holder, which is a decided departure from the conventional arrangement. As will be seen from Fig. 5, it has no clamp of the ordinary kind, but is held in position by a spring and by the angle at which it is presented to the commutator. The holder is supported by the flattened rod *a*, a spring *b* through latch *c*, frame *d* and pressure point *e* forcing the brush against the commutator by a gentle pressure, which may be graduated by placing the latch *c* in the various notches provided for it. The shape of the brush, the angle at which it is placed and the slight friction between it and the commutator, make its position secure, even when the commutator runs upward, as it obviously is when it runs downward.

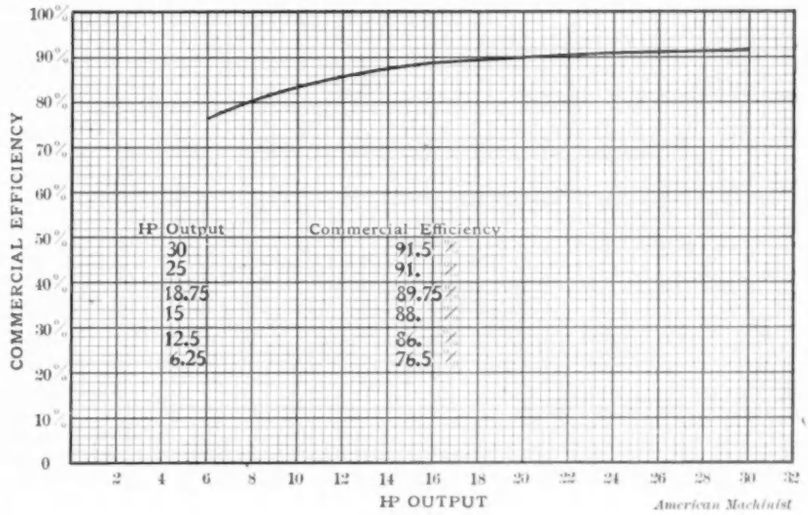


Fig. 6

EFFICIENCY CURVE OF 25 HORSE-POWER MOTOR.

Fig. 6 gives the curve of efficiency of one of these motors under a wide range of load. The electrical engineer has a great assortment of efficiencies; the chief use of which seems to be to befog the unsophisticated purchaser. The efficiency recorded in this diagram is the only one in which the purchaser has any real interest, namely, that between the current supplied and the work delivered.

This machine is being placed on the market by the C. & C. Electric Company, who are the designers.

▲ ▲ ▲

Letters from Practical Men.

Australian Gap Lathes.

Editor American Machinist:

I read with considerable interest that letter from Australia in your issue of October 14th. Although the Antipodean practice is well set forth, it is not likely to commend itself to American machinists, and we will probably still be content to each go along in our own way. It is simply impossible to conceive of an American shop having a lot of lathes, and every one of them, except one 12-inch lathe, a gap lathe. It would be impossible for such a shop to live and prosper in competition with a shop equipped with a variety of tools, each best adapted to its own line of work. I can very well understand how the first lathe in a jobbing shop that meant to grab all the work it could get, and grow up on it, might be a gap lathe. But as soon as business increased and other lathes were added, I cannot see why lathes better adapted to certain classes of work should not be selected. A gap lathe is a compromise and a makeshift. Like all other combination tools, it has a wider range, but nothing within that range is as well, as quickly, or as cheaply done. It cannot be claimed to be as stiff and strong as a big lathe for big work, nor as quick and handy as a regular small lathe for light work. I say nothing about accuracy, because a good man can do a pretty good job on almost any kind of a lathe. At least, a mechanic of the old school could have done it. Doing three-foot work and eighth of an inch work in the same lathe may be all right in Australia, but it is quite indefensible in America.

About the screw for the tool post, the

same style of conditions prevail with us. In the shop of which I spoke, where there were about thirty lathes, the largest 6-foot swing, and a good variety of other tools, there was no place on any lathe up to 30-inch swing where the clamping bolts for the tool, as a part of the lathe, would have been any advantage for the work that we did and for our way of doing it. The shop was a jobbing shop, and it is probable that we did fully as wide a range of work as Mr. Speechley does. He says that a tool bar, 2½ inches square, overhanging the rest 18 inches, could not be sustained with a slender tool post and a single screw. Certainly not; but that would be an exceptional job, and we would provide clamps which would hold it securely without permanently disfiguring and impairing the everyday pace of the lathe.

In any jobbing shop that I ever knew anything about, and no matter what its range of work might be, there would always be such a thing as dividing the work up and apportioning the jobs of different size and character each to its most appropriate tool. The idea that every tool must be able to do everything, makes each tool necessarily more or less slow and inefficient at everything, and that is what, in America, we purpose and plan to avoid.

Customers have a way of knowing a thing or two with us, and the fact of being able to do somehow any job that came along might for a time catch and hold them; but after a while they are very sure to find out, not only where they can actually get their work done, but also where they can get it done quickest and cheapest, and that will not be the gap lathe shop, with four bolts to tighten every time a tool is set.

In a jobbing shop I would certainly like to have one lathe, and only one, with the range of the gap lathe; but even then it would not be the English or Australian gap lathe, but the American two-spindle lathe, which has been described in the "American Machinist," and which it might be well for Mr. Speechley to look up. The two-spindle lathe seems to be superior to the gap lathe at every point. The regular functions of the regular small lathe are less impaired or interfered with than in the gap lathe, and at the same time it is also better in every way for the large work. It is also at all times instantly and equally ready for either the large or the small work. For the large work, a heavier spindle is provided and slower and stronger gearing. The setting back of the large spindle also brings the front of the work in better position for the tool post. It does not hang out in front, as with the gap lathe.

Perhaps Mr. Speechley will tell us what he thinks of this two-spindle lathe of which I speak. How would he like to have one in his own shop? I confess I would like to do something to draw out other letters from him. It is very pleasant to me to think of talking in this way with another mechanic on the other side of the world. We are not likely to get excited, fighting at such long range and with such slow weapons. As to the gap lathe, it strikes me that it is only a question of time about it. Mr. Speechley's account of his work and ways reminds me strikingly of the shop where I first worked, "before the war." We had no gap lathe there, but one of them would have been a godsend to us. The jacking up of a 3-foot lathe to turn 6 feet was a very frequent occurrence with us, and a gap lathe would have saved lots of time. But even then and there it would have been absurd to have suggested the installation of half a dozen lathes, because one would have been so handy.

Human nature is probably to blame for the gap lathe, or rather for the gap-lathe idea and the combination tool in general. People have such an idea that in getting one of these monstrosities they are getting two tools, and getting both for about the price of one. As the tool can be used for only one job at a time, it can never be more than a single tool; and as the work, large or small, is always done at more or less disadvantage, and therefore slower or not so good, it is really sometimes only a half a tool that is secured, and never a whole one. I prefer the whole tool that does a single range of work better than any other tool in existence.

MORRIS FULTON.

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Binding and Filing the American Machinist.

Editor American Machinist:

Having read with interest the method of binding and indexing the "American Machinist," given by Mr. Burlingame, in the issue of September 23d, I would like to add one other way which may interest your readers.

All are not in position to use "the office boy" for this purpose. It must be done during spare hours and a quick method is desired. Five years ago with six volumes of the "American Machinist," complete, making a very inconvenient load, the plan first suggested itself of taking from each issue the last eight pages, being the advertising matter.

This was best done, not by cutting, but simply tearing off, leaving the "cream" of the paper for further use. To bind conveniently for reference, I used the staple fastening, as in the magazines, and with the hand press, binding together the four or five issues of each month. This quickly completed the binding, and when marked, month and year, they were placed in heavy paper wrappers for each monthly volume.

This plan I have continued in use with a few changes. The rough appearance of the backs is improved by using a 1¼-inch strip of gummed bond-paper, extending over and under, covering the staples and presenting a neat appearance.

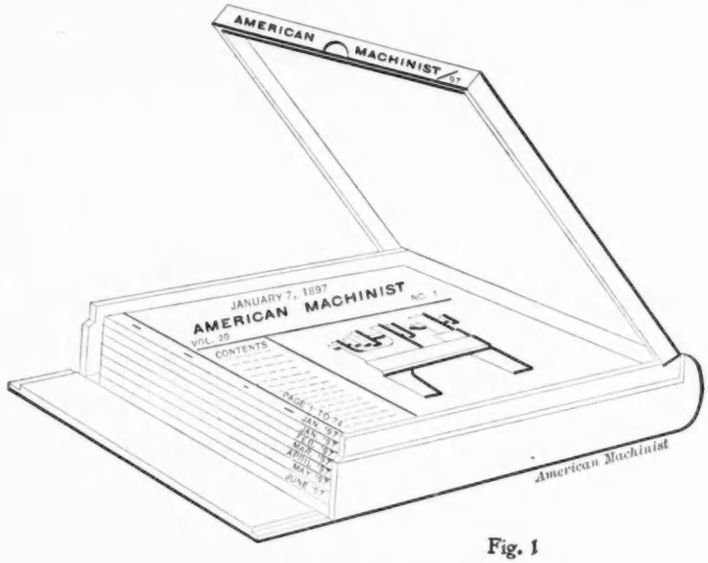


Fig. 1

FILING THE "AMERICAN MACHINIST."

On the narrow edge of the back is written the month and the year. This is also placed on the front page at the corner with the number of pages contained, as, from 577 to 652—a ready means of locating the same. Fig. 1 shows the idea clearly.

The much improved-size of the paper makes it convenient to use the letter or transfer file, which is easily obtained and is not expensive. They are "dust proof" and of very neat appearance.

Arranged as described, I am able to place the twelve monthly numbers in one file, thus completing the volume. I consider this an easy, cheap and convenient method. In regard to indexing, until recently I had none, other than as provided by you, and bound with the December month each year. To know that there is a vast amount of the best information in those years of bound volumes, and not

to be able to conveniently locate it, has often caused a desire for a better way.

I now remove the "contents," as given on front page, using the staple fastening for the four or five of each month. These are at hand and quickly locate any recent article, and are intended for cutting purposes, gumming the backs and placing on card or other form of indexing.

Fig. 2 is a Globe file, 10 x 12 x 2¾ inches. I have cut new sheets and made divisions suitable to my line of work. As shown, there are divisions of time saving methods and shop practice in departments photos of machinery men, your suggestions on shop improvements, design-

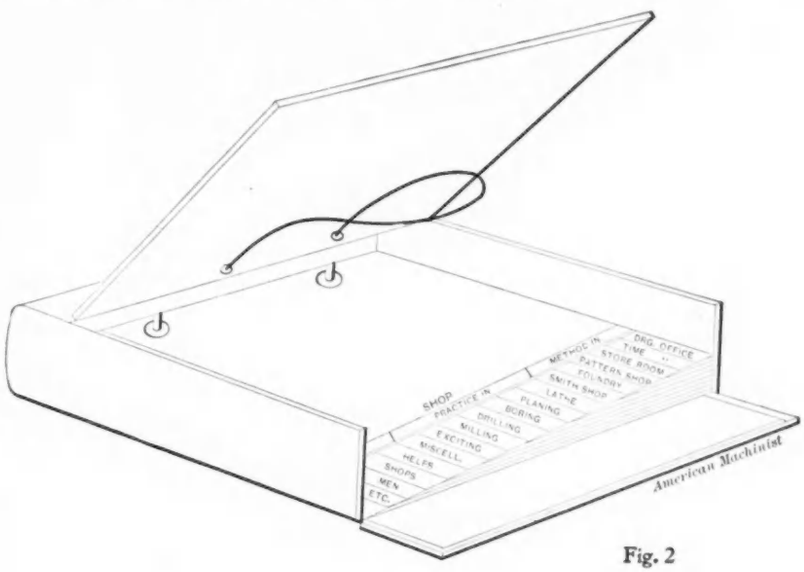
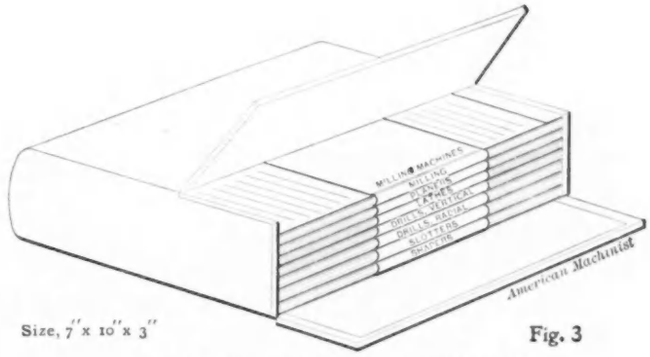


Fig. 2



Size, 7" x 10" x 3"

Fig. 3

FILING THE "AMERICAN MACHINIST."

ing, foreign notes, etc. Below these, not seen in the sketch, is the regular form, as for letters, but used for the descriptions of machines; for instance, in P (planers) are found descriptions of "A planer drive," the "air feed and clutch reverse" of the Niles Tool Works, etc. These can be separated as the matter accumulates—expansion is not limited.

This requires clippings to suit location. I am easily provided with an extra copy, coming to me second hand, one week late, from one having no wish to preserve for future reference.

Fig. 3 shows a method of wrapper filing the cuts of the latest designs in machine tools, taken from the advertising pages of the "American Machinist," many of which are equal to a photograph for purpose of reference. As readily seen, this will give the general practice on any line of tools without, as before, consulting many catalogs. I have found this convenient on several occasions, and always seek to add to it.

Figs. 1, 2, 3 show clearly the valuable helps your paper places at the disposal of its readers, and requiring but a small amount of time to keep in a condition for ready reference.

WM. PILTON.

Hamilton, O.

Fewer Teeth Do More Work.

Editor American Machinist:

I was interested in the article in your issue of September 2d, entitled "A Suggestion in Tap and Die Making," in which a tap was shown having every other tooth cut away. I had an experience some years ago with a large circular saw, which leads me to think that this may be a valuable improvement in taps and dies. I was sawing logs with an inserted-tooth saw having thirty teeth, and the power was light, so that we were forced to run on a very slow feed. We stopped one day and removed each alternate tooth from the saw, and immediately we found that we could cut the same logs with the same power, but with nearly twice the feed. But what surprised me most was that the remaining fifteen teeth required less filing per tooth—that is, less than half the filing that the thirty teeth required to do the same amount of sawing.

My later experience has taught me the philosophy of this, and it applies to cutting iron equally well. Every intelligent mechanic knows that it is wellnigh impossible to cut a thin shaving with a dull tool. When we endeavor to force this operation, the tool seems bound to either slip over the surface and simply rub and heat, or else to gouge in and get hold of something somewhat proportionate to the dullness of the tool. Now, take an ordinary nut tap with twelve threads to the inch and a taper on each side of, say, 1-32 inch per inch, that is 1-384 inch per thread. If there were but one flute in the tap, with proper clearance, each tooth would have to remove just 1-384 inch of metal at each revolution. But with the ordinary four flutes, each tooth must take a cut of just 1-1536 inch. Now, let a machinist take his lathe tool when it is as dull as the tooth of a tap that has seen some service, and endeavor to take a shaving 1-1536 inch thick from a piece of iron, and he will see the difficult task the tap has to perform. But let each alternate tooth be removed from the tap, and immediately each tooth has a cut of 1-768 inch, which I submit is a much easier operation after the first sharp edge is worn off the teeth.

Judging from my experience with the saw and with other tools with multiple teeth, I would not be surprised if the life of the tap were decidedly increased, as well as the power required to drive it decreased, by this change.

Of course, the same result, so far as the amount of cut per tooth is concerned, could be obtained by simply doubling the taper; but this would give twice as many teeth cutting at once as by removing each alternate tooth.

I have sometimes wondered why the ordinary nut tap is made with so slow a taper, when the corresponding die is given five or six times as much.

J. C. GREEN.

Hackettstown, N. J.

▲ ▲ ▲

There was a repairman once who spent all the brain energy he could possibly spare in getting up a pair of chain tongs with which to draw the two ends of the chain together and hold them while putting in the bolt, and yet he was not bright enough to run the chain ends over the front sprocket and join them there. It is the common trouble people seem to have, that they spend more time and thought in trying to find out how to do a thing they do not have to do than in learning what they should do.—"Cycling Gazette."

AMERICAN MACHINIST

Published Thursdays by

American Machinist Publishing Co.,
256 Broadway, New York.

John A. Hill, President and Treasurer.
C. A. Hansmann, Sec'y.

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The Publication of Inventions.

One of the questions which is received at this office with unfailing regularity, relates to the advisability of publishing a description of an invention in advance of an application for a patent—many inventors having the idea that such publication operates in some way to prejudice their rights.

In England this is the case; one of the absurdities of the English patent law being that a patented invention must be first disclosed to the public through the patent office. This makes secrecy there a matter of necessity, to the great inconvenience and expense of the inventor, in many cases. Imagine, for example, the perplexity of an inventor in privately experimenting on an improvement on the locomotive!

In no one thing, perhaps, is the liberality and common-sense nature of the American patent laws more clearly shown than in abolishing this ancient requirement of secrecy, and giving full opportunity for public trial without invalidating an inventor's rights.

The United States patent laws allow an inventor to obtain a patent for any invention not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application.

It will be seen from the above, that publication by an inventor of his own work does not prejudice his rights at all beyon ' compelling him to apply for a patent within two years, and, in fact, in cases where less than two years delay in applying for a patent is contemplated, such publication is distinctly advantageous, as it provides evidence of a date which may be of great value in case of interference. This term "interference" is used in the patent office to designate two or more simultaneous applications for patents on the same invention—the word simultaneous being used in a broad sense. In an interference case, the office takes evidence from both parties, and finally awards the patent to the one shown to have the prior claim, and, in fact, any patent not more than two years old is liable to have an interference declared against it on the appearance of a second claimant for the same invention. Now, of course, delay in the prosecution increases the possibility of an interference, and while in one sense the final decision is a simple matter of equity, still it is undeniable that the possessor of the patent has the advantage of position, inasmuch as the burden of proof is on the other party. The contingency of an interference is, however, remote, and in most cases not worth considering in this connection for the slight advantage of position which the possession of a patent insures.

In any case it has no other bearing on the question of publication than the slight danger of absolute theft, which involves perjury on the part of the thief, as every applicant for a patent must take oath that he believes himself the first inventor of the device in question. In all cases where delay in making the application is contemplated, which is usually the case with the inquiries which come to us, publication is, as already said, an absolute advantage, unless that delay is to be of more than two years duration, as it gives positive evidence of a date to which the inventor can refer, should his invention be finally thrown into interference.

One qualification should be made to the above, in connection with inventions which it is intended to protect in foreign countries. The requirement of secrecy obtains in nearly all countries except our own, and publication here would invalidate any patent subsequently taken out elsewhere—even such publication as is involved in an American patent, and, in fact, in cases where applications are simultaneously before the patent offices of different countries, it is the practice of all such offices, including our own, to delay the issue of patents after their allowance, in order that they may issue simultaneously, and so not invalidate one another. This consideration is, however, of little moment. If the number of inventions worth patenting in this country is, as we believe, small, the number worth patenting abroad is almost infinitesimal.

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Noise.

Noise is, like dirt, a nuisance. Much noise, like much dirt, is a great nuisance. As dirt is matter out of place, so noise is sound out of place. Dirt demands removal, and so is the great promoter of cleanliness. Noise is perhaps more insistent than dirt, and so has also its beneficent function, especially in the running of machinery. For many of the improvements and much of the perfection of modern machinery, noise only is to be thanked. Noise has done and is constantly doing much for lubrication, from the squeaking wheel-barrow and the baby carriage to the line shaft or the loose pulley in the shop, and so on clear to the top. Noise has saved the lives of half the steam engines and of many engineers.

When things are running all right there will be sounds, generally rhythmical, and therefore more or less musical, but never noise. As soon as things go wrong there is noise at once. The knock in the cylinder must be attended to or the head flies out. There are other noises about an engine which tell an engineer at once of minor disarrangements and give the opportunity of correction before wear or accident occurs. A deaf engineer would necessarily be an almost worthless and an unsafe one. Probably many persons do not appreciate the value of good hearing to an engineer. It is probable that on our railroads there should be tests for hearing as well as for sight, although we have not heard of them. Sound is constantly telling the stationary engineer of the condition of his engine, and noise tells of its maladjustment or derangement. Noise tells of the unwelcome presence of water in pipes and valve chests, as well as in the cylinder, of the incorrect action of valves, of abnormal changes of speed, of defective lubrication anywhere, of the displacement and rubbing of parts, of nuts or screws working loose, of connections or bearings that need taking up. An engineer that can hear noises in his engine room and be content under their continuance should be promoted to the outside of the door.

An ear sensitive to noise, with a proper

detestation of it, is one good qualification for a foreman or a superintendent. Noise means at least discomfort, makes men nervous and irritable, and will never allow them to do their best. We worked once for a long time contiguous to some rattling gearing, and we know what we are talking about. We passed through a foundry the other day where they had a very noisy power-driven sand sifter at work which must have had anything but a good effect on the men, and certainly did not increase the amount of work done, and we could not help wondering how the powers that be could permit such a nuisance. There are many preventable noises which might be stopped to the comfort and benefit of all concerned.

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Personal.

We will consider it as a favor if our readers will send in items of news regarding changes of foremen, superintendents or others prominently connected with the machine business. Such items are legitimate news of the trade, and we are glad to make room for them.

Naval Constructor F. L. Fernald, U. S. N., will be retired November 11th.

Passed Assistant Engineer R. S. Griffin, U. S. N., has been detached from the Bureau of Steam Engineering to duty on the Vicksburg, the new gunboat.

Mr. L. E. Rhodes, formerly of the L. E. Rhodes Company, of Hartford, Conn., has associated himself with the Davis & Egan Company, Cincinnati, O., and will have charge of the department in which they manufacture Lincoln millers, hand millers, etc.

Frank Radford, for a number of years superintendent of the tool-making department of the National Cash Register Company, of Dayton, O., is now a member of the firm of Bayer & Radford, of that city, manufacturers of railway jacks and special machinery to order.

Professor C. R. Richards, Director of the School of Mechanic Arts, of the University of Nebraska, has been appointed Commissioner for the Mechanical Section of the Trans-Mississippi and International Exposition, which is to be held in Omaha during the summer of 1898. All inquiries regarding space, etc., should be addressed to him.

On Oct. 1st, Jeremiah M. Allen completed his thirtieth year as President of the Hartford Steam Boiler Inspection and Insurance Company. Under Mr. Allen's management the company has prospered wondrously. The cash capital has increased from $100,000 to $500,000, and the assets now exceed $2,000,000. About 62,000 boilers are insured by the company.

Mr. John Needham, head of the firm of Messrs. John Needham & Son, well-known iron and steel merchants, of Manchester, started last week on a special tour to America, during which Mr. Needham will visit a number of the iron and steel works in various parts of the United States, facilities having been afforded to him for an inspection of some of the principal establishments in the above branches of industry.

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A driver for J. B. & J. M. Cornell, Architectural Iron Works, New York City, was fined $25 for making too much noise on the streets. He had a load of steel beams with no provision for preventing rattling. The noise caused in this way is a great annoyance and easily preventable, and we will probably hear much less of it in the future.

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Questions and Answers.

Name and address of writer must accompany every question. Questions must pertain to our specialties and be of general interest. We cannot undertake to answer questions by mail.

(150) H. L. T., New Haven, Conn., asks how the paper for making reverse blueprints is prepared. A.—The paper for this purpose is supplied already prepared, by the dealers in drawing instruments and materials. We are not acquainted with the method of preparation.

(151) J., Peoria, Ill., asks: Why are not wagon wheels made like bicycle wheels, to carry the weight by the upper spokes instead of on the lower ones? A.—It may be only a question of time, or the bicycle type of wheel may not be best for heavy work. Some of the bicycle wheels are appearing on light road wagons, and as they seem to be satisfactory, we may expect to see more.

(152) W. P. F., Roanoke, Va., asks if there is any leakage through the pores of metal pipes containing air under pressures of 100 to 150 pounds. A.—Unless the pipes are defective, no. The reservoirs used in connection with the dynamite gun and the compressed air system of street cars carry pressures of 2,000 pounds and upward, and they hold this pressure for days, and even weeks, at a time with no material loss.

(153) D. H., Seymour, Ind., has an ice machine, of which the crank pins give trouble by heating, and he wishes to know if they are large enough. The cylinders are 10 inches diameter, the pressure 150 to 180 pounds per square inch, the speed 85 revolutions per minute, and the pins 3½ inches diameter by 3¾ inches long. A.—The lower pressure gives approximately 900 pounds per square inch of projected area of pin, and the higher pressure approximately 1,100 pounds. Many engines are running successfully with a pin pressure as high or higher than 1,100 pounds, although where such pressures are used we think babbitted bearings are found necessary, and we regard such pressures as beyond the limits of the best practice. You do not say whether the compressor is single or double acting. If the former, then we should say that the pin is too small. In a double-acting engine the alternation of pressure assists lubrication, but in a single-acting engine, the pressure being always in the same direction, larger bearings are desirable.

(154) W. L. B., Muskegon, Mich., writes: I have a case of power transmission like this: The first shaft from a water wheel runs at 100 turns per minute. On this is a 72-inch pulley with a 16-inch belt driving a 48-inch pulley on a 3-inch shaft, 60 feet long; then a 72-inch pulley on the other end of this shaft drives a 36-inch pulley on a counter-shaft, and from this another 36-inch pulley drives to an 18-inch pulley on a saw arbor carrying a heavy circular saw. The power supposed to be used is about 60 horsepower. We have trouble with the 3-inch line shaft, which seems to be too light; the couplings have given out two or three times already. What is it best to do about it? A.—The line shaft should have been 4 inches. The pulleys may be changed so as to speed it up, and relieve it of some of the strain in that way. Let the 72-inch pulley drive a 36-inch, and then a 54-inch pulley on the other end of it drive to the 36-inch pulley on the counter-shaft. The line shaft will thus be speeded up to 200 revolutions instead of 150, and the speed of the saw will be the same as before.

(155) J. A. G., Johnsonburg, Pa., asks: 1. How is the point of compression of a steam engine influenced by the speed? A.—The object of compression is twofold, first to fill the clearance spaces with steam, and second to absorb the momentum of the reciprocating parts, and so pass the centers without pounding. The point of compression is made earlier in the stroke in the case of high-speed engines, partly because the clearance spaces are relatively larger, so that more compression is needed to fill them, and partly because, owing to the higher speed, more cushion is needed to absorb the momentum. It should also be said that, with the forms of valve gear used on high-speed engines, a heavy compression is a necessity, and could not be avoided even if it was desired. 2. Describe the surface condenser and jet condenser. A.—The surface condenser consists of a large cast-iron vessel containing a coil of brass pipe. The cooling water circulates within the pipes, and the exhaust steam is admitted to the vessel around the pipes, the steam being condensed by the cold surfaces. In a jet condenser the water is injected, through a rose head, directly into the interior of the condenser. It will be seen that in the surface condenser the cooling water and condensed steam are kept separate, so that salt or otherwise impure water may be used without contaminating the condensed water which is fed back into the boiler. With the jet condenser impure condensing water contaminates the condensed steam, compelling the use of the impure water for the boiler. Consequently, the jet condenser is commonly used when the condensing water is pure, and the surface condenser when it is impure.

(156) J. H., London, Eng., writes: We have a pair of hoisting engines driven by compressed air. The cylinders are 15 inches diameter and 36 inches stroke, and the piston speed is about 200 feet per minute. The air at 60 pounds gage pressure is cut off at quarter stroke. The unbalanced load raised is 2,800 pounds, at a speed of about 400 feet per minute. When the engines are running, a vacuum begins to be formed in the cylinder almost immediately after cutting off, certainly before half stroke, and increasing to the end of the stroke. Why is this peculiar action produced? As the vacuum must mean "load" to the engine, what is the simplest means of negativing it? A.—The engines are too large for the work. The air should not be cut off at quarter stroke for any air pressure below 100 pounds gage. With 60 pounds air cut-off at quar-

ter stroke the pressure will fall to atmosphere at three-quarter stroke, and, as in this case this gives too much power, the air is also probably wire drawn by throttling, the initial pressure is not maintained to the point of cut-off, and atmospheric pressure may therefore be reached considerably before the three-quarter stroke, with, of course, increasing vacuum to the end. The horse-power required for the load is $(2{,}800 \times 400) \div 33{,}000 = 34$. The horse-power of the engines at the figures given, the mean effective air pressure being 23.6 pounds, is: $15^2 \times .7854 \times 23.6 \times 200 \times 2 \div 33{,}000 = 50.5$. The difference is evidently more than should be required to overcome all friction, so that throttling must have been resorted to. The remedy would be to change the gearing, thereby slowing the engine relatively to the speed of the load. More accurate data all through should be secured before determining the speed ratio that would be most desirable.

(157) R. D. M., Bridgeton, N. J., asks: What is the effect of centrifugal force, due to the earth's rotation, upon the weight of a man weighing 150 pounds—that is, if a man weighing 150 pounds at the equator were transferred to the pole, what would be his gain in weight? A.—The problem is made more simple by reversing it; i. e., assume the man's weight to be 150 pounds at the pole, and then calculate the weight at the equator. The centrifugal force of any revolving body may be found from the following formula:

$$F = \frac{W v^2}{g R}$$

in which

F = centrifugal force in pounds,
W = weight of the body in pounds,
v = the velocity in feet per second,
g = the acceleration due to gravity,
R = the radius of rotation in feet.

For this case we have

$W = 150$,
$v = 1{,}522$,
$g = 32.089$ (value at the equator),
$R = 20{,}923{,}000$.

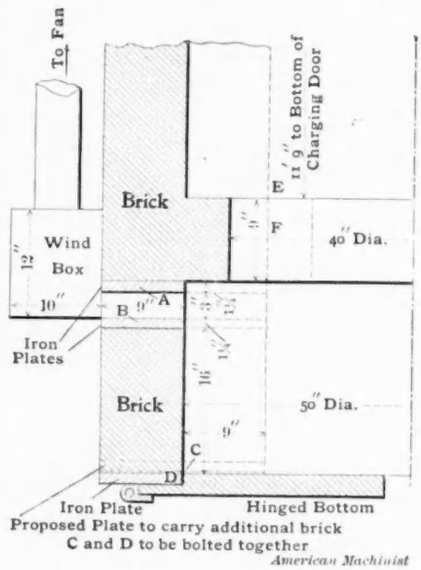
Substituting the above values, we obtain

$$F = .518 \text{ pounds.}$$

This value of F gives the effect of the centrifugal force, which is what you ask about. In point of fact, the man's weight would also depend upon the variation of the value of g with the latitude, in consequence of the earth's not being a perfect sphere. The combined effect of the centrifugal force and the flattening of the earth at the poles is, to make the weight of any body at the equator less than that at the pole by 1-192d part of the polar weight. You understand, we presume that the change in weight would require a spring balance for its detection. The weights of the ordinary gravity balance would have their value changed in the same proportion that the weight of the man was changed, so that, on such a scale, the weight of the man would appear to be the same at all latitudes.

(158) J. C. W., Montpelier, Ind., asks: 1. How can I divide a circle into degrees, as I have no protractor? A.—It all depends upon what instruments you actually have and what kind of a fellow you are. The problem of course is, to divide the circumference of a circle into 360 equal divisions. Draw as big a circle as possible. If your work does not require a big circle, you can draw one, all the same, outside of it. As you have drawn a circle, it must be that you have a pair of compasses, or their equivalent. Without changing the set of the compasses, you can divide the circle into six parts, or sectors of 60 degrees each. Bisect each sector twice—don't ask us how to do this—and you will then have the circle divided up into sectors of 15 degrees each. A simpler way to get to this point is by the use of a T-square or straight edge in connection with the two triangles of 30 and 45 degrees, which all draftsmen now use. Now divide one of these sectors first into five smaller sectors, and then each of these into three. You will then have fifteen single degrees of the circle. To save the trouble of going through with the same operation all around the circle, you can take a piece of paper wide enough to cover the fifteen degrees and stick a pin through it in the center of circle, and trim off the edge of it to the circle. You can then mark the edge to correspond to the fifteen 1-degree spaces already obtained, and moving the paper to the next sector, you can mark it off, and so on all around the circle. The accuracy of the work will depend upon the care with which it is done and the sharpness and precision of the marks used. It can in no case be expected to be nearly as correct as a machine-graduated protractor. If the radius of the circle is 12 inches, the length of arc for 1 degree will be 0.20944 inch. 2. How much liquid gasoline does it take to make a charge for a gasoline engine to the cubic foot of free air? A.—The best gasoline engines use about 1-10 gallon per horse-power; but as the engines are governed by the quantity of gasoline admitted while a constant speed is maintained, the ratio of gasoline to air volume is constantly changing. 3. At what ratio does the power consumption increase as the speed of a revolving pulley increases? A.—With the same pull of belt the transmission of power will be directly as the speed. 4. In your opinion, which of the several special mechanical movements shown in the last few weeks is the best and most mechanical? A.—Not one of them was good enough to deserve further discussion.

(159) D. A. McC. says: We have a cupola in our foundry, a sketch of which I enclose. It is far too large for our use, and I propose to reduce its diameter about 18 inches by lining it all the way up with fire-brick. The amount of the extension of the walls is indicated by the dotted lines. The iron plates *A* and *B* would of course have to be replaced by wider ones, and a plate placed above the bottom door to support the bricks below the tuyeres. Do you think the cupola would work well under these conditions? A.—Mr. L. C. Jewett, to whom we referred this question, writes: As a preface, I would say I never saw a lining like that, and do not believe that the projection above the tuyeres will work to advantage. The intention is, to insure the air going to center of cupola, to insure more perfect distribution of oxygen with the carbonic acid gas, to get perfect combustion. The effect will be to have a shelf at *E* to catch iron that comes trickling down, which will congeal there; and while the cupola could melt iron, no doubt, the smaller the diameter through and just above the tuyeres, the shorter the interval it can be kept in blast. To reduce that section of this cupola 18 inches, would leave but 22 inches just above the tuyeres. I doubt very much if they could melt much more than 3 tons, besides having a monkey and parrot time cleaning it out for the next heat. To line straight, as per dotted line *F*, will give a 32-inch cupola, which, with a blast of 12 oz. pressure, ought to melt from 4 to 5 tons per hour, and be capable of taking out about 7 tons in a heat, sure.



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American Lathes in England.

A valuable series of papers is appearing in "The English Mechanic and World of Science," describing and comparing the details of English and American lathes. In the latest issue at hand we find the following:

"Having noted the principal points of difference between the standard English and American lathe-heads, we may next trace the means by which the connections are made between the head-gears and the lead-screw and feed-rod and the saddle of the slide-rest. In these we shall find the American arrangements much superior to ours. They are more handy, as the headstock gears themselves are more compact, and are more readily manipulated. Changes from screw-cutting to turning feeds are more readily made, and the lathe man has everything in front of him and immediately to hand. The Americans are ever scheming dodges to save time and increase ease of manipulation, while in England these are generally deemed of less value than durability and power. The results are seen in the greater diversity in design in the former than in the latter, and also in the graver fact that American light lathes are displacing those of English type to a large extent. One cannot close one's eyes to the fact that the former are come to stay. The reason is not that they are cheaper than those of English manufacture, but that they are handier for light work. The same remark applies also to other American machinery; but we are only now concerned with lathes.

"Since preparing the last article, the writer has been spending a few days' holiday in visiting shops in the Midlands. In the shops of Messrs. Alfred Herbert, of Coventry, devoted entirely to the production of machine tools, fully nine lathes and machines out of ten are of American type. And the shop is one which is ar-

ranged and organized in a most perfect manner in all respects, and the principals are too keen to adopt innovations without good reason. The same remark applies to the shops of the Daimler Motor Company, while into older firms, where the English tools still largely predominate, those of American type are finding their way. The writer heard a gentleman make a public statement that a firm in which he had an interest was equipped entirely with American tools, simply because he could not get English ones to do the work. The cycle firms are very largely equipped with American tools. American lathes and machines were much more in evidence at the National show last December at the Crystal Palace than English ones. The writer is speaking from personal knowledge only, but the agents say, too, that it is impossible to keep much stock, so great is the demand. English tool-makers, when the subject is mentioned, are inclined to pooh-pooh the matter, and say that the foreign lathes come here because English makers are too busy to execute orders. The real reason, however, is that the American lathes are handier than English. A proof and commentary on this is to be seen in the fact that some of their best features are being imitated by pushing English makers, while a goodly number of lathes are being built in England wholly on American lines. J. H."

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The bursting of fly-wheels still goes on. When they do fly to pieces it is almost invariably on account of abnormal speed. There is usually an inefficient or an inoperative governor to blame. The throttle valve also should receive some attention in this connection. When the engineer notices the engine running away, it is the most natural thing in the world for him to run to the throttle, and many a man has lost his life in that way, because the throttle is pretty sure to be in the most dangerous place that could be selected. Then again the standard throttle is such a slow-acting thing that on that account also it is an element of danger. If such a valve must be used, and we see no reason for it, there should also be a quick-acting emergency valve, and this could easily have a cord connected with it by which the steam could be instantly shut off from a dozen different points. This arrangement would be especially desirable in electric stations.

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A common attachment to passenger elevators is a centrifugal governor, operated by a separate rope, which is depended upon to set the safety latches when too great a descending speed is attained. One or two recent accidents seems to suggest that the operative speed to which the governors are adjusted is not sufficiently near the normal running speed. They act, indeed, but not until a very dangerous speed is reached. In one case recently, a hoisting cable broke and the carriage dropped four stories before the catches engaged, and the knee of one man was dislocated by the sudden stoppage. It is easily possible to adjust the governors more closely.

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The fire fiend must have a peculiar and unrelenting spite against the Garvin Machine Company, of New York. This firm, having been the victim of two or three disastrous fires, contrived their latest factory so that it couldn't burn up, any more than the one-hoss shay could break down, and now the building containing the electric generators by which the entire factory was driven is a pile of smoking ruins. The fire occurred on Sunday afternoon, October 17th.

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"The Engineer," London, gives a curious illustration of the power of light matter to perforate substances much harder and more tenacious. A cast iron target plate 1 inch thick, and placed at an angle of 45 degrees, was perforated after three or four shots, by a solid clay cylinder 3 inches long and 1⅞ inches diameter, weighing 7½ ounces. The calculated velocity was over 1,800 foot-seconds.

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The strike of the engineers in England seems to be damming up the flow of industry far back. Many vessels on the stocks are waiting for their engines, and cannot be launched. The ships not launched keep the berths where others should be built; from this the plate and angle mills feel the effect, and then the coal and other industries also suffer.

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The preliminary notice of the fall meeting of the American Society of Mechanical Engineers announces the date of the fall meeting to be from November 30th to December 3d.

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Commercial Review.

NEW YORK, Saturday Evening, Oct. 16.

WOOD-WORKING MACHINERY

is the line of industry whose business conditions we have made the subject of investigation this week, and we find that it manifests, in some quarters, decided symptoms of improvement. Take, for instance, the following letter which has been received from the Defiance Machine Works, of Defiance, O.:

"We manufacture a general line of wood-working machinery. During the past four years, when business was dull in the States, we made a special effort to sell our goods in foreign countries, and the result was that we have run our works with a full force of men constantly in filling foreign orders, depending very little indeed upon customers in the States. Within the past two months our business at home has improved wonderfully. We are receiving orders constantly for heavy and expensive machines, such as used in wagon and wheel factories, and every day we are receiving more orders, so that we think in a very short time we will be able to run overtime. The prospects with us are certainly most encouraging. During all the dull times we have not reduced our prices or the quality of our work, but rather improved the quality and maintained our rate of wages, keeping all of our employés in a happy frame of mind, and at the same time keeping our prices where they properly belong. We are expecting an extremely large business throughout the States before spring."

In the New York City district, trade is somewhat improved, as far as its prospects are concerned, in sympathy with the generally returning business confidence. Actual demand, however, shows little increase. To some extent this is due to the approach of the election, which has had some tendency to smother business for the past fortnight; but that is probably nothing more than a slight temporary disturbance. Last year, when the whole nation was in a state of suspense, there was some excuse for withholding orders, but to do so on account of merely local elections seems without excuse. Perhaps the attempt of certain parties to produce an impression that the question of a social revolution throughout the nation is the issue involved in a municipal choice has something to do with it.

The remark is made that a notably large percentage of wood-working machinery now in demand is for pattern-shop use. This is taken to indicate that industrial improvement is manifesting itself earlier in the foundry and iron lines than in wooden work generally.

The New York office of the Berlin Machine Works, Beloit, Wis., report a very bright state of affairs in their trade, which extends all over the East. Exports they find to exhibit no unusual features. One order came from Germany last week. It is true that last spring this company were receiving a still larger volume of orders than at present, a circumstance which they are not alone in experiencing.

Certainly the wood-working machinery business is far better than it was just a year ago, in the stagnation preceding the Presidential election. Here is a letter from the Frank H. Clement Company, Rochester, N. Y., who so find it to a marked degree:

"Our sales are running fully up to the average, and are about three times as great as last year, preceding the election; they are not so great as they would be, but for the large quantities of second-hand machinery still in the hands of dealers and manufacturers. From 1886 to 1892 more new furniture and kindred factories were built than could live healthily, and the depression following caused many of them to be sold at any price to realize settlements for creditors. Much of this machinery is still on the market. The outlook is good, and if the country can be assured tariff and currency peace for a few years, we feel sure that machinery

men in our line will regain their confidence and recoup their losses. Unless this much-desired condition holds, it will probably be a question of the 'survival of the fittest' during the next five years."

The above communication speaks of the quantity of second-hand machinery in the market. This has long been a bane to the manufacturers. Fortunately, although it continues to come upon the market, it is beginning to do so in a different way from that in the past. Instead of woodworkers selling off their old stock of tools because they have no work to do, they will, with improving business conditions, remove it to install new.

The yellow fever in the South is naturally a factor of some importance in wood-working machinery, because this is a line of goods which spreads out over Southern lumber regions, and is less than iron-working machinery confined to the manufacturing towns of the North. This is a matter alluded to in the following letter from J. A. Fay & Co., Cincinnati, O.:

"Since writing you, some two or three months ago, we have found a decided improvement in our business, its volume having been considerably more than the corresponding months for the last four years. At present we feel the effects of the yellow fever in the South, it causing nearly an entire suspension of our business in that section; but as soon as the frost comes we believe it will be checked, and we will from now on have a decidedly better business than we have had since May, 1893."

The combination of woodworking machinery manufacturers has not yet been completed, and the subject has so long been in the air, that no definite assertion can be made of the outcome until tangible evidence thereof is produced. However, it is said that fifteen companies have already signed the agreement, and the information has come to us very directly from one of the chief promoters that it is hoped to have the matter settled by November 1st.

JOTTINGS IN OTHER LINES.

A well-known New England small-tool manufacturing concern writes that it is full of work. It is putting in new machines every month and has some thirty-five or forty old ones in its shed which they have thrown out since the first of this year.

The Davis & Egan Machine Tool Company, of Cincinnati, O., have sold through their Berlin office, a large line of lathes, shapers, drill presses, etc., to the A. Borsig Company, of Germany. This

(Continued on page 37.)

Business Specials.

Gear wheels, gear cutting. Grant; see page 16.

Forming Lathes. Mer. Mach. Tool Co., Meriden, Ct.

Anything in brass. H. D. Phelps, Ansonia, Conn.

Brass ptrn. letters and figs., for sweatg. on metal ptrns. Knight & Son, Seneca Falls, N. Y., Box 12.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N. Y.

Cost of Manufacturing—Experienced manager will establish system of costs, giving exact account of every detail. Charge based on saving effected. Correspondence solicited. Geo. C. Thomas, 99 Nassau Street, New York, Room 212.

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Wants.

Situations and Help Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. The Cash and Copy should be sent to reach us not later than Saturday Morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Situations Wanted.

Pat. m'k'r wants pos.; 5 yrs exp. Box 19, AM. MACH.

Mech. draughtsman, shop and drawing room experience, desires to change. Box 22, AMER. MACH.

Pos. wanted by an experienced mech. engineer; specialty wood-working mchy. Box 50, AM. MACH.

Practical mechanical draftsman is open for steady position; 12 years experience. Box 49, AM. MACH.

Experienced mech. draftsman, tech. grad., moderate salary, desires position. Box 44, AMER. MACH.

Wanted—By a journeyman pattern maker position as foreman. Address Box 36, AM. MACHINIST.

Graduate M. E., some shop experience, 4 years superintendent light manufacturing plant desires position. Box 45, AMERICAN MACHINIST.

Tool maker, used to grinding machines, hardening, close measurements, all-round machinist, wants position. Box 46, AMERICAN MACHINIST.

Capable young machinist, 6 years' exp. engine building, etc., wants pos. Well educated and a hustler; location immaterial. Box 35, AMER. MACH.

Tech. grad. (member A. S. M. E.), with 20 yrs. shop and drawing room experience, desires a situation; terms moderate. Address Box 187, Bethel, Conn.

Duplex Pumps—Wanted, position as general foreman, well up in best and quickest methods of producing same; 15 years exp.; specialist on outside matters; best ref. "Duplex Pumps," AM. MACH.

An experienced chief draughtsman and designer desires to change; qualified by 12 years' experience with leading builders of Corliss, pumping, mining, air compressor and large direct connected engines. Box 30, AMERICAN MACHINIST.

An A1 machine expert of 25 years' practical experience in factory arrangement and management in every detail desires a position; can give undoubted references and show success in the past; was never discharged. Address Box 26, AM. MACH.

An active, practical mechanic having extensive experience in the handling of foundries, machine shops, etc., in electrical, power transmitting and various other lines, desires a position as superintendent or manager. Would prefer a percentage of the profits, or will take an interest as a partner. Address Box 39, AMERICAN MACHINIST.

Mechanical engineer, with extensive experience as superintendent and manager of large machine works, is open to engagement. Stationary and marine engines, boilers, foundry work, gearing and general machinery. Can manage shops, engineering department, estimate or solicit. Best of references. Address Box 33, AMERICAN MACHINIST.

Help Wanted.

Wanted—Draughtsman, eng. and general work; good designer. Robt. Wetherill & Co., Chester, Pa.

Wanted—A moulder to take charge of foundry; give age, experience and nativity. Phoenix Iron Works, Port Huron, Mich.

Wanted—A superintendent for a machine shop and foundry working 200 men; state experience. Address Box 38, AMERICAN MACHINIST.

Wanted—Foundry foreman for New England concern mfg. engs. and mchy.; give age, exp., pay expected and references. Box 41, AMER. MACH'

A reliable hammer-smith, experienced in operating Bradley helve hammer on light work, can obtain permanent sit.; West Conn. Box 48, AMER. MACH.

Wanted—In a Western city, a first-class mechanic who has had a practical experience, to assume general management machine shop business; state full particulars. Box 43, AMERICAN MACHINIST.

Wanted—A first class mechanic, about 35 years old, as superintendent; one who is used to handling men, is temperate in habits and can keep all the details of a small shop in mind; must have had some years experience in the manufacture of dynamos and motors. Address, stating wages, exper. and including refs., "A. B." Box 302 Madison, N. J.

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Miscellaneous Wants.

Advertisements will be inserted under this head at 30 cents per line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Cheap 2d h'd lathes & planers. S. M. York, Clev'd, O.

Calipers & Gauges. F. A. Welles, Milwaukee, Wis.

The Dutton Wet Twist Drill-Grinder is sold by the Garvin Machine Co., New York City.

Best and cheapest Bolt Header, made by Baush & Harris Machine Tool Co., Springfield, Mass.

Light and fine mach'y to order; models and electrical work specialty. E. O. Chase, Newark, N. J.

For Sale—Second-hand drill presses, engine lathes & planers. Dietz, Schumacher & Boye, Cincinnati, O.

For Sale—Machine shop and foundry, $10,000 cash, balance on easy installments; good reason. Box 220, care MACHINIST.

We make a specialty of Shartle's patent safety set collars. Prices low and samples free. Middletown Machine Co., Middletown, Ohio.

For Sale—Small machine shop, having good repair trade, in town of 14,000 inhabitants; no opposition. Box 42, AMERICAN MACHINIST.

Tool manufacturing concern, centrally located, with ample capital, desires to add a line of specialties. Address Box 40, AMERICAN MACHINIST.

Model Locomotives—Complete castings, latest N. Y. Cen. standard, up to date; 4c. in stamps for cat. alog. G. H. Olney, 163 Herkimer St., Brooklyn, N. Y.

Mechanical drawings, tracings, blue prints; inventing and des'g. Strictest confidence observed. Green Bros., 5 Beekman St., Room 524, New York.

Lathes, planers, drills, milling machines, vises, also brass working machinery second-hand; must be modern and in first-class condition. C. C. Wormer Machinery Co., Detroit, Mich.

$15,000 to $20,000 wanted for an established manufacturing business. $60,000 already invested; the additional capital to be used to increase the business. Money secured, and one-half the profits and salary to satisfactory party to act as financial manager. Box 47, AMERICAN MACHINIST

EUROPEAN AGENCY.

An Old Established English Firm of Merchants is open to consider a few additional Agencies for American Machinery and Appliances in Europe. They have several houses in the United Kingdom, including central premises in London. One of the principals expects to visit the U.S.A. shortly.

Address Box 12,

AMERICAN MACHINIST.

A Commutator Necessity. Ask your supply house or the manufacturer for free sample stick . . .

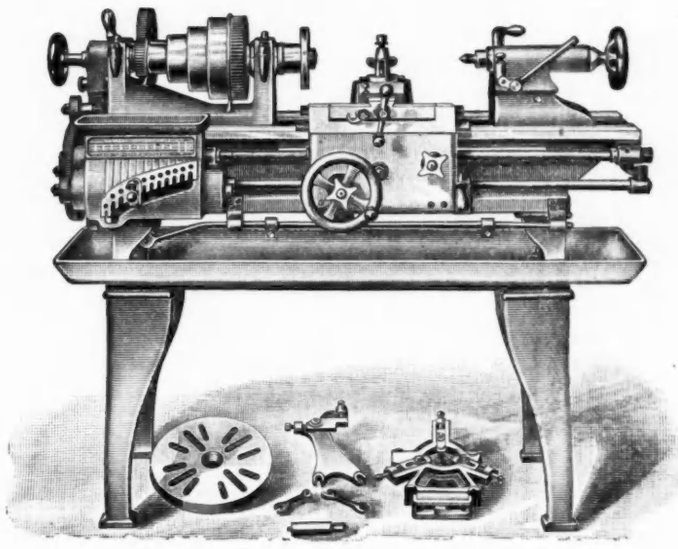
50 cts. per stick. $5.00 per dozen.

The only article that will **prevent sparking.** Will keep the Commutator in good condition, and **prevent cutting. Absolutely will not gum the brushes.**

K. McLENNAN & CO., Sole Mfrs., 1128 Marquette Building, Chicago, Ill.

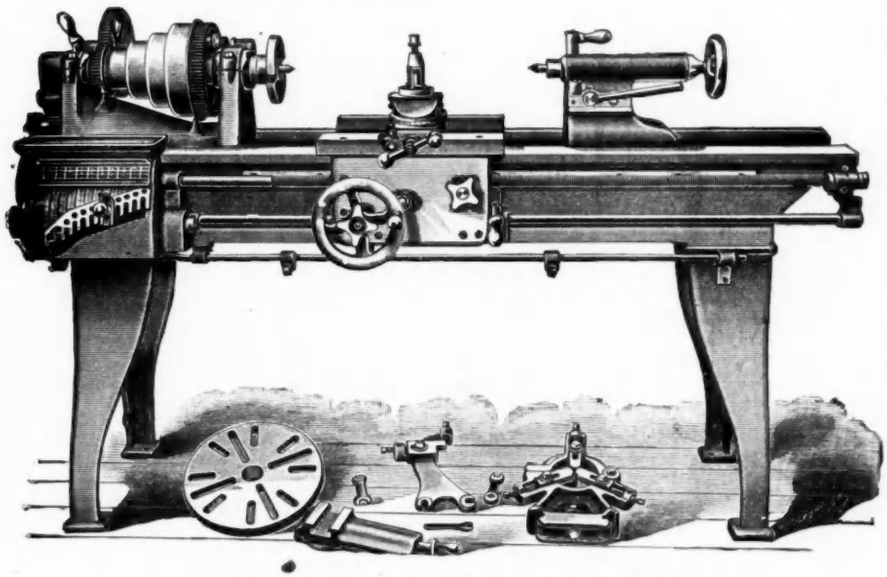
Hydraulic Punches, Jacks and Presses

The Watson-Stillman Co., 202 East 43d Street, New York.



12" Hendey-Norton Lathe

is fitted with drawing-in sleeve and American Watch Tool Co's standard chuck, used in making small taps, reamers, etc. Work finished first and cut from bar afterwards. No centering required. See carriage reverse lever by right-hand side of apron; no reaching for countershaft shipper required.



14" x 6' Hendey-Norton Lathe.

These lathes are modern, high-grade, practical tools, and are specially adapted for tool-room work. They have the Norton Attachment for screw cutting, giving 36 different threads and 36 different feeds with only two changes of gear and movement of lever in gear-box from one notch to the other. Note the automatic stop under apron. It will automatically stop carriage at any desired point in either direction; invaluable for internal or duplicate work. SEND FOR CATALOGUE.

The Hendey Machine Company,

Torrington, Conn.

Agents for the Pacific Coast, Pacific Tool & Supply Co., San Francisco, Cal.

European Agents, { Schuchardt & Schütte, Berlin, Vienna, Brussels, Stockholm. Chas. Churchill & Co., Ltd., London and Birmingham, Eng. Adphe. Janssens Paris, France. Eugen Soller Basel, Switzerland.

(*Continued from page 36.*)

is one of the largest locomotive works in Europe, employing over 8,000 men.

A banking house in New York placed orders this week for machinery and tools for the German market which, it is claimed, will exceed $30,000 in value.

Electrical companies in this vicinity have been bidding upon the contract for an electric-lighting plant in Belize, British Honduras, which will amount to upward of $40,000.

Projects are on foot to manufacture bicycles in Mexico in competition with this country, and some of the wheels are expected to be completed by January.

The City Council of Catania, Italy, is asking for proposals for the construction of an electric railroad in that city. Two firms are at present trying for the concession of the franchise, one a Berlin firm and the other a Catania firm. Should the latter be the successful party they will purchase all material, such as wire, cars, rails, dynamos, etc. This firm, Fratelli Prinzi, have promised to give attention to any American manufacturers who desire to make propositions to supply any or all of this road equipment, but up to the present they have not received any communications from the United States on the subject, although they have from manufacturers of other countries. No action will be taken on the matter before the latter half of November, and there is yet time if our manufacturers will act at once, to do something in this matter. An electric street railway, of American construction, at such a place as Catania, with its 25,000 inhabitants, would be a standing advertisement for American industry, and would be the entering wedge for our commerce with Sicily in machinery, tools, etc. Communications on the above subject may be addressed to Consul L. H. Bruhl, at Catania, who will cheerfully give all desired information.

Quotations.

NEW YORK, Monday, October 18.

Iron—American pig, tidewater delivery:

No. 1 foundry, Northern	$11 75 @ $12 00
No. 2 foundry, Northern	11 25 @ 11 50
No. 2 plain, Northern	10 75 @ 11 00
Gray forge, Northern	10 50 @ 10 75
No. 1 foundry, Southern	11 00 @ 11 25
No. 2 foundry, Southern	10 50 @ 10 75
No. 3 foundry, Southern	10 25 @ 10 75
No. 1 soft, Southern	11 00 @ 11 25
No. 2 soft, Southern	10 75 @ 11 00
Foundry forge, or No. 4, South'n	10 00 @ 10 25

Bar Iron—Base—Mill price, in carloads, on dock: Common, 1.05 @ 1.10c.; refined, 1.15 @ 1.20c. Store prices: Common, 1.25 @ 1.35c.; refined, 1.30 @ 1.50c.

Tool Steel—Ordinary sizes, standard quality, 6 @ 7c., with some grades perhaps a little less; extra grades, 11 @ 12c.; special grades, 16c. and upward.

Machinery Steel—Ordinary brands, from store, in small lots, 1.60 @ 1.70c.

Cold Rolled Steel Shafting—Base size, from store, in small lots, 2.15 @ 2.25c.

Copper—Carload lots, Lake Superior ingot, 11¼c.; electrolytic, 11 @ 11⅛c.; casting copper, 10⅞ @ 11c.

Pig Lead—Carload lots, 3.95 @ 4.00c., f. o. b., New York.

Pig Tin—For 5 and 10-ton lots, 13.90c., f. o. b.

Spelter—Carload lots, 4.20 @ 4.25c., New York delivery.

Antimony—About 7.85c. and upwards for Cookson's; 7.25c. and up for Hallett's.

Lard Oil—Prime city, ice pressed, ordinary quality, in wholesale lots, 40 @ 42c.

Manufactures.

John C. Fletcher, Gibson Station, N. C., contemplates installing new machinery.

The Standard Oil Company will erect a tinplate mill opposite New Kensington, Pa.

The Patton manufacturing plant has been burned at Lenoir City, Tenn. Loss, $10,000.

The Kellogg Weldless Tube Company, of Findlay, O., is about to make additions to its plant.

The ground where the Earncliffe Mill, of Olneyville, R. I., is to be built this fall has been broken.

The Oldtown (Me.) Woolen Company will enlarge its plant by a purchase of a shoe factory in that town.

H. G. Torry is building a new shop on Railroad avenue, Stirling, N. J., in which railroad brasses will be made.

The Odell Manufacturing Company, of Concord, N. C., will establish a roller-covering works in connection with its mill.

It has been decided to enlarge the plant of the Lalance-Grosjean Company in Harrisburg, Pa., by the addition of at least two more mills.

Wilbur Slack, a manufacturer of wagon wheels, has decided to remove his manufacturing plant from Frenchtown to Trenton, N. J.

The Woodmanse & Hewitt Manufacturing Company, Freeport, Ill., are erecting an addition to their shop, to be used for a galvanizing room.

The Pfaltzgraff Stoneware Manufacturing Company, Limited, York City, Pa., is erecting a new engine room, and a new boiler will be placed.

The firm of Robert Dobson & Co., Pittsfield, Me., has decided to build an addition to its woolen mill, the size to be 56 x 100, and two stories high.

The Grand Ledge Chair Company, of Grand Ledge, Mich., will remove to Bluffton, Ind., and occupy the three-story brick North furniture factory.

The McClary Manufacturing Company, of London, Ont., is about to establish a factory at Montreal, and is looking for a site upon which to build.

The Big Circle Mining Company, of Carthage, Mo., has been incorporated by H. H. Green, A. N. Rinehart, C. A. Blair and others; capital stock, $30,000.

The foundation walls are being constructed for a new foundry at the Card Electric Works, Mansfield, O. The dimensions of the new structure will be 100 x 40 feet.

The Evans Milling & Elevator Company, Denver, Col., has been incorporated; capital stock, $10,000. Incorporators: William H. Black, George C. Briggs and others.

The Pittsburg Valve & Machine Company, of Pittsburg, Pa., have just gone into business, and will manufacture valves and piping work for blast furnaces and mill work generally.

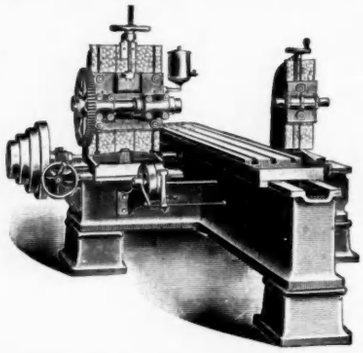
The Charles Munson Belting Company, of Chicago, will locate a factory on River avenue, Allegheny, Pa., which will employ about 100 hands. A. J. Groetzinger & Sons are interested.

The E. P. Allis Company, Milwaukee, Wis., is to build a foundry north of Stewart street and east of Allis street. The building will be 87 x 27 feet in ground dimensions and 45 feet high.

The Davis & Egan Machine Tool Company, of Cincinnati, O., have secured, through their office at Dusseldorf, Germany, an order from the Krupp Works, of Essen, for a number of machine tools.

Improvements are being made to the

(Continued on page 39.)



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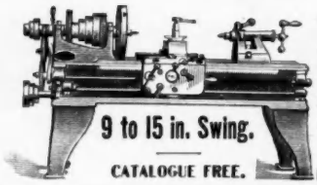

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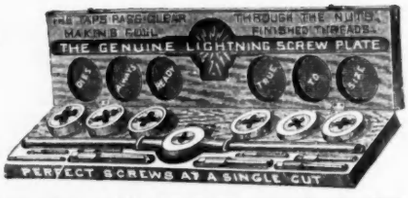

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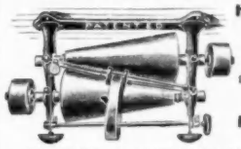
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MOLINE ELEVATOR CO.
MOLINE, ILL.

(Continued from page 38.)

Florence Mills at Forrest City, N. C. The Henrietta Mills, of Henrietta, N. C., recently purchased this plant, and is making the additions referred to.

The Illinois Stamping Company has moved from Chicago to Detroit, Mich., and located in the buildings formerly occupied by the Galvin Valve & Hydrant Company, corner of Clark avenue and River street.

Mr. Robert S. Wiesenfeld announces that he is about to organize a company and erect a plant for the manufacture of improved horseshoes. A site near Sparrows Point, Md., is now being negotiated for.

The Pottsville Iron & Steel Company, Pottsville, Pa., which went into receivers' hands several months ago, has formulated plans of reorganization, by which the plant may resume and give employment to 1,000 hands.

The J. W. Dann Manufacturing Company, Columbus, O., will remove to Tullahoma, Tenn., to establish much the same line of business the firm has been engaged in for the past few years—that of manufacturing buggy shafts and poles.

The Hubbard Milling Company, Mankato, Minn., has been incorporated with a capital stock of $75,000. R. D. Hubbard, head of the old R. D. Hubbard Milling Company, is president; George M. Palmer is treasurer, and Jay Hubbard secretary.

It is learned that Frederick Cate, Weymouth, Mass., will erect a 100-foot addition to his factory. This will give facilities for doubling the output of the factory, and will also give employment to 500 hands—twice the number now needed.

The Pinney-Wheeler Leasing & Mining Company, Denver, Col., recently filed notice with the Secretary of State that the capital stock of the company would be increased from $5,000 to $100,000. The company deals in all kinds of mining property.

The Missouri Car & Foundry Company, St. Louis, Mo., has been incorporated to do a general foundry and car building business. The capital stock is $2,000,000. William McMillan, W. K. Bixby, W. N. McMillan and James Connolly are interested.

Frank D. Howe, manager of the Hidden Treasure Mine at Neal, Idaho, makes the announcement that a mill is to be erected on the property at once. The mill will be 10 stamps at present, and furnished with improved concentrating machinery.

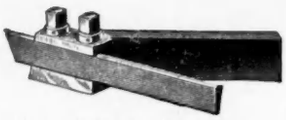
The Shenango Tin-Plate Company, of New Castle, Pa., has been incorporated with a capital stock of $500,000. The principal stockholders are William Patterson, John Stevenson, Jr., and W. E. Rice, of New Castle, each of whom holds $100,000 of the stock.

The Cleveland Machine Screw Company, of Cleveland, O., has purchased the entire stamping business of the A. L. Moore Company, of that city. They are now adding additional machinery to the stampings plant which will more than double the present facilities.

Plans and specifications have been issued to contractors for the erection of a large addition to the machine shop of the Hyde Windlass Company, at Bath, Me. This addition will be 132 feet long, 60 feet wide, and composed of steel and brick. The new structure will be capable of employing sixty additional machinists.

The Darling Pump Company, Williamsport, Pa., has purchased a plot of ground adjacent to the wire rope works, and will soon break ground for a new building. The building will be 100 x 140, one story high, and it is expected to be ready for occupancy in two months. The company is composed of Charles N. and J. Lewis Hough and R. H. Thorn.

The Blanchard Iron Company, of Findlay, O., has been incorporated with a capital stock of $25,000. The incorporators are John D. Briggs, Hiram W. Briggs, C. A. Barr and William A. Eyal. It is understood that the new company will immediately purchase the plant of the defunct Findlay Rolling Mill Company from Assignee Gary, and proceed without delay to place the plant in the proper condition to be operated.



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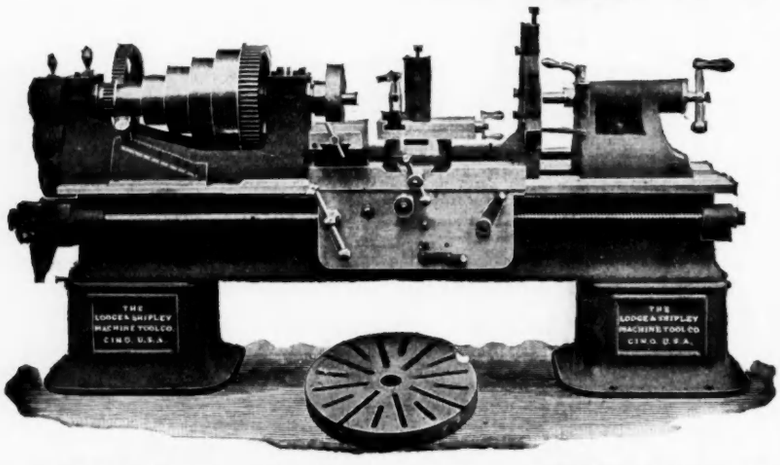

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Ames Iron Works, Oswego, N. Y.
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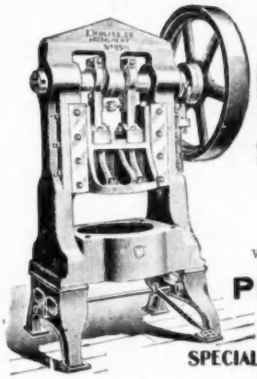

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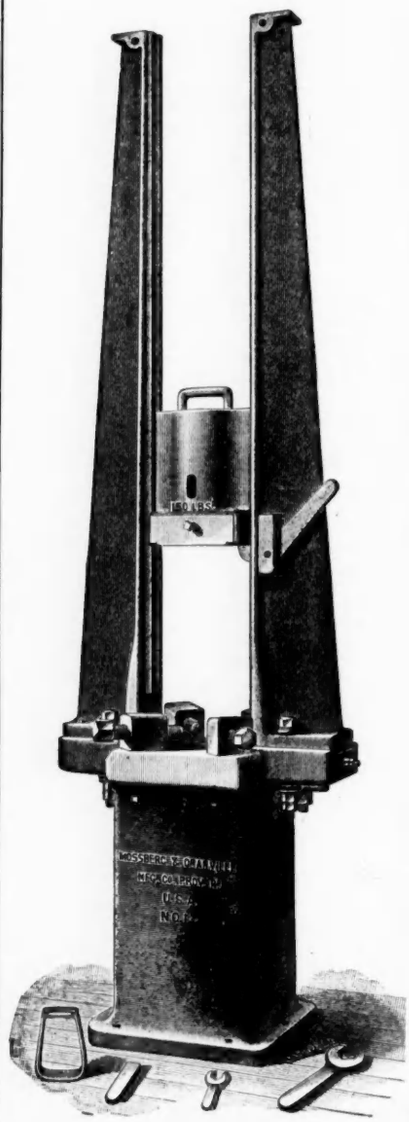

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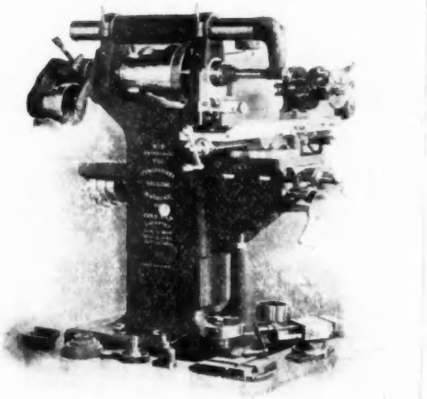

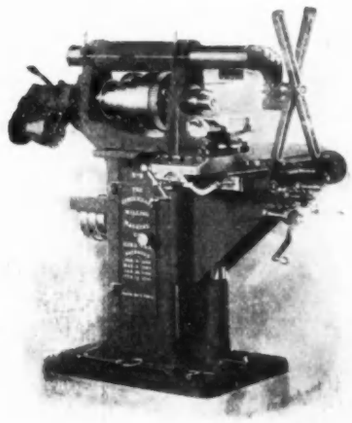

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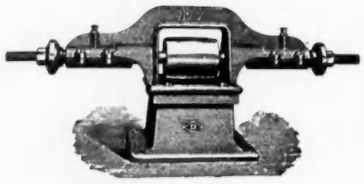

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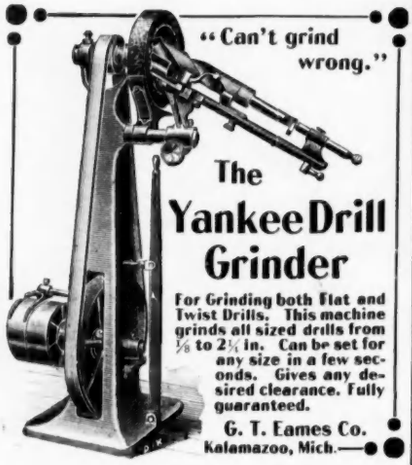

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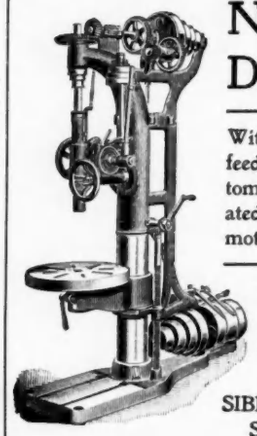

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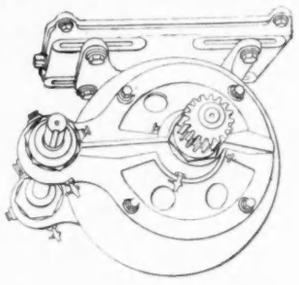

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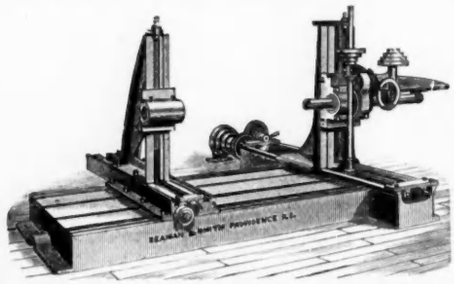

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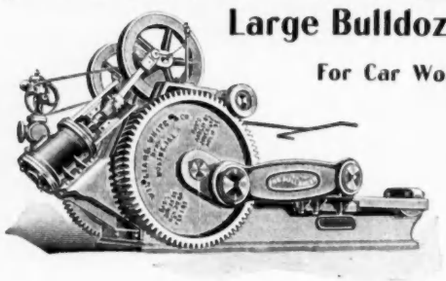

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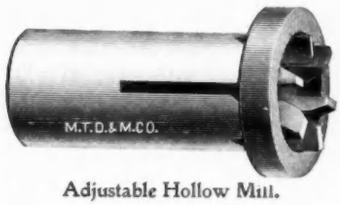

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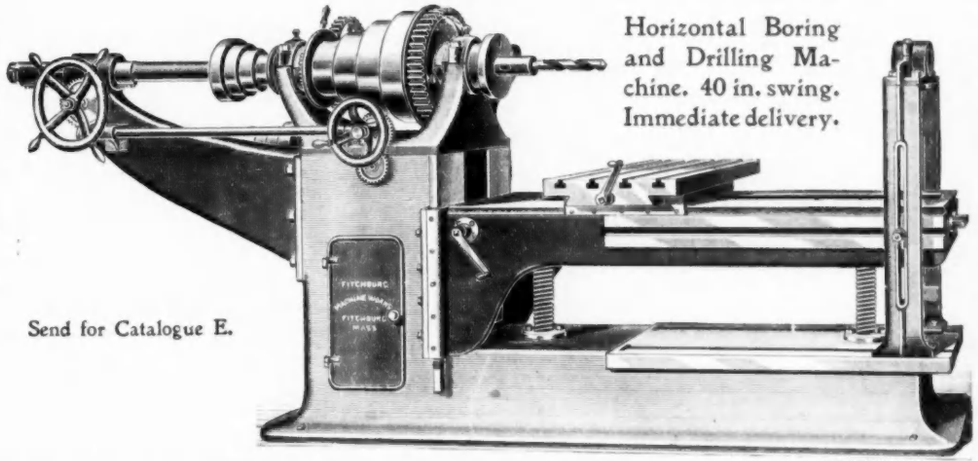

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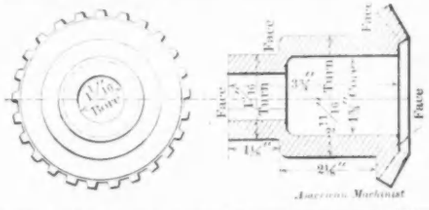

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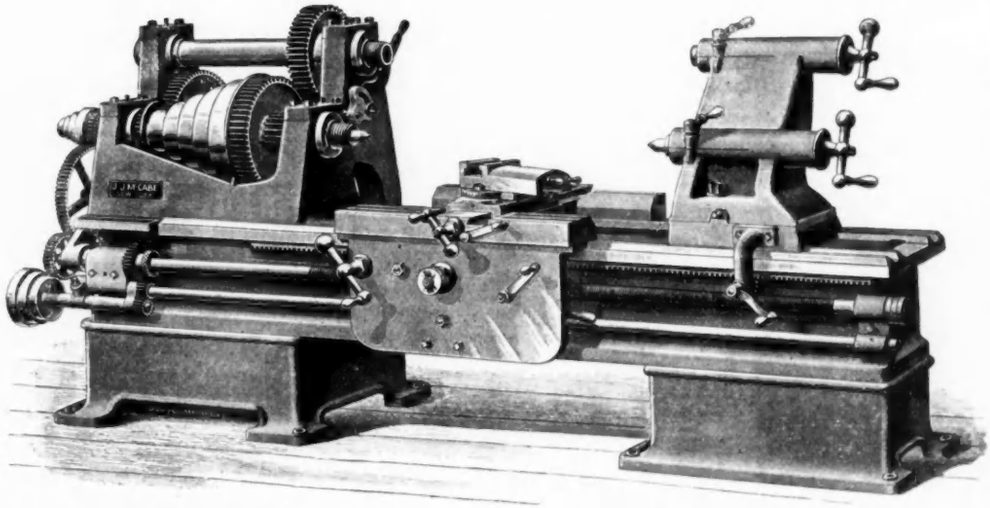

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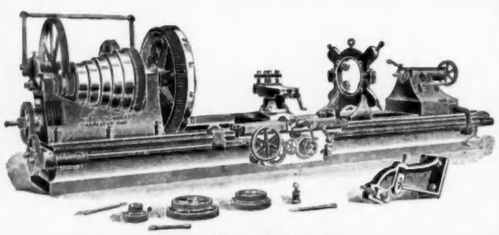

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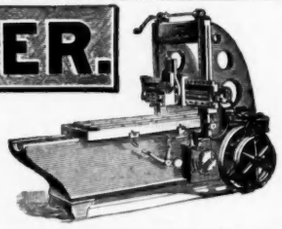

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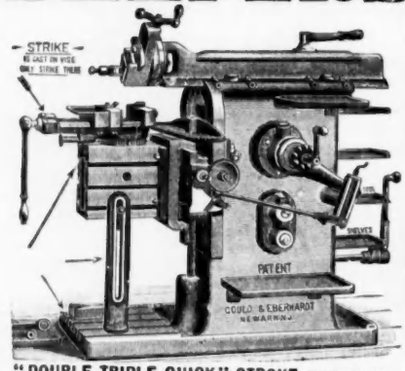

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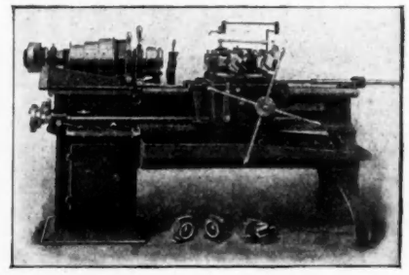

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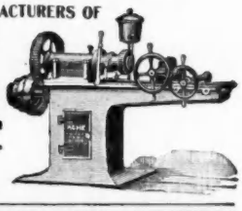

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